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EXPERIMENTAL SURFACE-PRESSURE DISTRIBUTIONS ON A 9° SPHERICALLY BLUNTED CONE AT MACH NUMBERS FROM 1.50 TO 4.63

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Langley Station, Hampton, Va.

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SUMMARY

An investigation has been conducted in the Langley Unitary Plan wind tunnel to determine the pressure distributions on a 9° spherically blunted cone at Mach numbers from 1.50 to 4.63 with Reynolds numbers of 2.25×10^6 and 3.00×10^6 per foot (7.38×10^6 and 9.84×10^6 per meter). Angle of attack was varied from 0° to 12°. The surface pressures were integrated in order to obtain forebody forces and moments. The experimental surface pressures and integral forces and moments were compared with an existing theoretical method which predicts surface pressures and aerodynamic characteristics. Comparison of the experimental and theoretical results showed good agreement for surface pressures at moderate angles of attack except at the lower Mach numbers. Comparison of the results for forces and moments generally showed good agreement.

The process of integrating surface pressures has been programed for high-speed digital computation. The program is written so that it will apply to arbitrary bodies of revolution. For convenience, the program is presented with the necessary operating details.

INTRODUCTION

The present investigation was undertaken as part of an NASA effort aimed at defining the aerodynamic characteristics of blunt bodies of revolution in general and of shapes representing the final stages of multistage rocket vehicles in particular.

The present wind-tunnel tests were conducted to determine the surface-pressure distributions and the static longitudinal aerodynamic characteristics of a 9° spherically blunted cone at supersonic speeds and to compare the experimental results with the theoretical method presented in reference 1. The integration of the surface pressures to provide the force and moment data was accomplished by a high-speed digital-computer program (written to accommodate arbitrary bodies of revolution) which is described in

the appendix. The tests were conducted at Mach numbers of 1.50 to 4.63, at Reynolds numbers of 2.25×10^6 and 3.00×10^6 per foot (7.38×10^6 and 9.84×10^6 per meter) and at angles of attack of 0° to 12°.

SYMBOLS

The units used for the physical quantities in this report are given both in the U.S. Customary Units and in the International System of Units (SI). Factors relating the two systems are given in reference 2. The reference moment center is taken at the nose of the model.

C_A	forebody axial-force coefficient, $\frac{\text{Forebody axial force}}{q_\infty S}$
C_m	forebody pitching-moment coefficient, $\frac{\text{Forebody pitching moment}}{q_\infty S l}$
C_N	forebody normal-force coefficient, $\frac{\text{Forebody normal force}}{q_\infty S}$
C_p	pressure coefficient, $\frac{p_s - p_\infty}{q_\infty}$
d	base diameter, feet (meters)
l	body length, feet (meters)
M	Mach number
p	static pressure, pounds/foot^2 (newtons/meter^2)
q	dynamic pressure, pounds/foot^2 (newtons/meter^2)
R	Reynolds number
r_n	nose radius, feet (meters)
S	area of model base, feet^2 (meters^2)
s	distance along body meridian measured from nose (see fig. 1), feet (meters)
T	temperature, degrees Fahrenheit (degrees Kelvin)

x,r body coordinates (see fig 1), feet (meters)

α angle of attack, degrees

θ angular position measured counterclockwise about center line of model (see fig 1), degrees

Subscripts:

∞ free-stream conditions

s conditions on body surface

t stagnation conditions

MODEL, APPARATUS, AND TEST CONDITIONS

The layout of the model is shown in figure 1, and a model photograph is presented in figure 2. The model consists of a spherical nose that fairs into a conical body having an included angle of 18.0°. The model was instrumented with two rows of pressure orifices located 180° apart. Remote control of model roll angle through 90° was provided so that complete pressure distributions might be obtained.

Tests were conducted both in the low and in the high Mach number test sections of the Langley Unitary Plan wind tunnel, which is a variable-pressure, continuous-flow tunnel. The test sections are approximately 4 feet (1.2 meters) square and 7 feet (2.1 meters) long, and the nozzles leading to the test sections are of the asymmetric sliding-block type. These nozzles permit a continuous variation in the Mach number from 1.5 to 2.9 in the low Mach number test section and from 2.3 to 4.7 in the high Mach number test section.

The test was performed at the following conditions:

M_∞	T_t		p_t		R	
	°F	°K	lb/ft^2	N/m^2	per foot	per meter
1.50	150	339	1250	59 850	2.25×10^6	7.38×10^6
1.90	150	339	1907	91 310	3.00	9.84
2.30	150	339	2298	110 000	3.00	9.84
2.96	150	339	3253	155 800	3.00	9.84
3.95	175	353	5794	277 400	3.00	9.84
4.63	175	353	5794	277 400	3.00	9.84

The test was conducted with natural boundary-layer transition. The dewpoint, measured at stagnation pressure, was maintained below -30° F (239° K) to assure negligible condensation effects.

ACCURACY

The accuracy of the measured quantities, based on calibration and repeatability of data, is estimated to be within the following limits:

C_p	±0.01
α, deg	±0.10
M_∞ = 1.50 to 2.96	±0.015
M_∞ = 3.95 to 4.63	±0.05

The model angle of attack was corrected in the tunnel to compensate for flow angularity.

RESULTS AND DISCUSSION

Surface pressures were measured on the forebody of the model at Mach numbers from 1.50 to 4.63 with Reynolds numbers of 2.25×10^6 and 3.00×10^6 per foot (7.38×10^6 and 9.84×10^6 per meter). Angle of attack was varied from 0° to 12°. The pressure-distribution data are presented in graphic and tabular form. (See figs. 3 to 8 and tables I to VI.)

A comparison of the calculated and experimental pressure data is made in figures 3 to 8. For comparison purposes, as pointed out in reference 1, three basic areas appear to be of interest. These areas are the stagnation region ($0 < s/l < 0.1$) where the pressures are high and the flow subsonic, the overexpansion region ($0.14 < s/l < 1.1$ depending on Mach number) where the pressures may expand well below conical pressure for the cone afterbody, and the region in which the pressure recovers from the overexpanded value to conical pressure. The comparison of the theoretical method with experimental results indicates good agreement in the stagnation region at all Mach numbers considered. Figures 3 to 8 also indicate that the existing theoretical method agrees well with experimental results in the areas of the overexpansion and recovery to conical pressure, except at the lower Mach numbers where the experiment shows larger over-expansion effects and more rapid recovery to conical pressures.

In order to obtain experimental values of the forebody forces and moments, the surface-pressure distributions of tables I to VI were integrated to provide the axial forces, normal forces, and pitching moments for the model at all test conditions. The

process of integration has been programed for high-speed digital computation. The program is a research convenience and is presented in the appendix with the necessary operating details.

The forces and moments obtained from the integration of the experimental pressure data are presented in figure 9 along with the forces and moments provided by the theoretical method of reference 1. Figure 9 indicates that the forces and moments predicted by the existing theoretical method are generally in good agreement with the experimental data for the model.

CONCLUDING REMARKS

An investigation has been conducted in the Langley Unitary Plan wind tunnel to determine the pressure distributions on a 9° spherically blunted cone at Mach numbers from 1.50 to 4.63 with Reynolds numbers of 2.25×10^6 and 3.00×10^6 per foot (7.38×10^6 and 9.84×10^6 per meter). Angle of attack was varied from 0° to 12°. The surface pressures were integrated in order to obtain forebody forces and moments. The surface pressures and integral forces and moments were compared with an existing theoretical method which predicts surface pressures and aerodynamic characteristics. Comparison of the experimental and theoretical results for surface pressures showed good agreement at moderate angles of attack, except at the lower Mach numbers. Comparison of the results for the forces and moments generally showed good agreement.

The process of integrating surface pressures has been programed for high-speed digital computation. The program is written so that it will apply to arbitrary bodies of revolution. For convenience, the program is presented with the necessary operating details.

Langley Research Center,
National Aeronautics and Space Administration,
Langley Station, Hampton, Va., November 12, 1968,
124-07-02-44-23.

APPENDIX

COMPUTER PROGRAM TO DETERMINE AERODYNAMIC FORCE AND MOMENT COEFFICIENTS FROM SURFACE-PRESSURE COEFFICIENTS

The computer program integrates the surface-pressure coefficients in order to obtain the axial-force, normal-force, and pitching-moment coefficients. The purpose of this appendix is to provide a description of the necessary input and output as well as a FORTRAN listing of the source program. Two example input cases and the resulting output listing are included.

DESCRIPTION OF PROGRAM

The program reads in the body geometry in terms of the body x,r coordinates (listed as X,R in computer program) starting at the nose. It then reads in the pressure coefficients along the meridian lines at each of the respective body coordinates. The program integrates the pressure distributions along the respective meridian lines of the input body to obtain the force and moment coefficients. For purposes of integration, a continuous surface-pressure distribution is obtained from linear interpolation of the input pressure data. The moment center is taken at the origin of the body-coordinate system. The program is written so that it will apply to arbitrary bodies of revolution with the only limitation being that the body not exceed three maximums and minimums in the longitudinal variations of the body shape.

PROGRAM LISTING

The FORTRAN listing of the source program used at the NASA Langley Research Center on the Control Data 6600 computer system is presented as follows:

```
      PROGRAM MAIN      (INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
      DIMENSION THETPL(10),XTAB(100),R1(100,10),CP1(100,10),CP2(100,10),
     1DELCPT(100,10),XTABT(100,10),XTAB2(100),THETA(20),R(100),XA(100),
     2R2(100),ID(8),ANSCA(20),AXT(100),YA(100)
      COMMON NTHET,THETA,ANSCA,THETPL,DELCPT,R1,XX,XTAB,AXT,XTABT,SS,
     1LENGTH,J,YA,XA,N,II,CA,CN,CM,KSTOP3,KSTOP2,KSTOP1,KKODE,R2,CP1,CP2
      REAL LENGTH
      NAMELIST/NUM/N,XTAB,R,CP1,CP2,NTHET,THETPL,SS,LENGTH
    1 READ(5,2) ID
    2 FORMAT(8A10)
      WRITE(6,5) ID
    5 FORMAT(1H1,///8A10)
```

```
      DO 13 KL=1,10
      DO 13 LK=1,100
      CP1(LK,KL)=0.
      CP2(LK,KL)=0.
      DELCPT(LK,KL)=0.
      XTABT(LK,KL)=0.
   13 R1(LK,KL)=0.
      READ(5,NUM)
      XDEL2=XTAB(N)/100.
      XTAB2(1)=0.
      DO 44 KL=2,100
   44 XTAB2(KL)=XTAB2(KL-1)+XDEL2
      DO 4 J=1,N
      XA(J)=XTAB(J)
    4 YA(J)=R(J)
      DO 3 LL=1,NTHET
      KODE=0
      THETA(LL)=ABS(THETPL(LL))
      IJ=2*NTHET+1
      THETA(IJ-LL)=-ABS(THETPL(LL))
      DO 222 JJ=1,N
      R1(JJ,LL)=R(JJ)
      DELCPT(JJ,LL)=CP2(JJ,LL)-CP1(JJ,LL)
  222 XTABT(JJ,LL)=XTAB(JJ)
      DO 45 JJ=1,100
   45 CALL FTLUP(XTAB2(JJ),R2(JJ),+1,N,XA,YA)
    3 CONTINUE
      WRITE(6,100) (THETA(I),I=1,NTHET)
  100 FORMAT(///5X15HTHETA  ANGLES  (10F10.2))
      WRITE(6,105)
  105 FORMAT(/7X1HX9X1HR7X42H1ST QUADRANT SURFACE PRESSURE COEFFICIENTS/
     1)
      DO 10 I=1,N
   10 WRITE(6,101) XTAB(I),R(I),(CP1(I,J),J=1,NTHET)
  101 FORMAT(F10.4,F10.4,10F10.5)
      M=2*NTHET+1
      WRITE(6,100)(THETA(M-I),I=1,NTHET)
      WRITE(6,106)
  106 FORMAT(/7X1HX9X1HR7X42H2ND QUADRANT SURFACE PRESSURE COEFFICIENTS/
     1)
      DO 11 I=1,N
   11 WRITE(6,101) XTAB(I),R(I),(CP2(I,J),J=1,NTHET)
      WRITE(6,104) SS,LENGTH
  104 FORMAT(//10X15HREFERENCE AREA=F8.4,10X17HREFERENCE LENGTH=F8.4)
      J=N-1
      KK=1
      DO 610 KJ=1,J
      IF(YA(KJ).EQ.YA(KJ+1)) GO TO 610
      KK=KK+1
      YA(KK)=YA(KJ+1)
      XA(KK)=XA(KJ+1)
  610 CONTINUE
      KSTOP1=0
      KSTOP2=0
      KSTOP3=0
      J=KK-1
```

```
      DO 6000 KK1=1,J
      IF(YA(KK1+1).GT.YA(KK1)) GO TO 6000
      KSTOP1=KK1
      DO  6001 KK2=KK1,J
      IF(YA(KK2+1).LT.YA(KK2)) GO TO 6001
      KSTOP2=KK2
      DO 6002 KK3=KK2,J
      IF(YA(KK3+1).GT.YA(KK3)) GO TO 6002
      KSTOP3=KK3
 6002 CONTINUE
      KSTOP3=J+1
      GO TO 6003
 6001 CONTINUE
      KSTOP2=J+1
      GO TO 6003
 6000 CONTINUE
      KSTOP1=J+1
 6003 CALL FORCES
      WRITE(6,1003) CA,CN,CM
 1003 FORMAT(///15X3HCA=F8.5,7X3HCN=F8.5,7X3HCM=F8.5//)
       GO TO 1
      END



      SUBROUTINE FORCES
      DIMENSION THETPL(10),XTABT(100,10),DELCPT(100,10),XTAB(100),
     1R1(100,10),CP1(100,10),CP2(100,10),THETA(20),ANSCA(20),
     2AXT(100),YA(100),XA(100),FOCNCM(2),R2(100),
     3CNCM(2),FOFR(2),ANS3(2)
      COMMON NTHET,THETA,ANSCA,THETPL,DELCPT,R1,XX,XTAB,AXT,XTABT,SS,
     1LENGTH,J,YA,XA,N,II,CA,CN,CM,KSTOP3,KSTOP2,KSTOP1,KKODE,R2,CP1,CP2
      REAL LENGTH
      EXTERNAL FUNA,FUNC,FUNCN,FUCNCM
      DO 1 I=1,NTHET
      SUM1=0.
      SUM2=0.
      A1=0.
      ICODE=1
      DO 3 JJ=2,100
      B1=R2(JJ)
      IF(((B1.GE.(A1+.0000000001)).OR.(B1.GE.(A1-.0000000001))).AND.
     1ICODE.EQ.1) GO TO 11
      IF(((B1.GE.(A1+.0000000001)).OR.(B1.GE.(A1-.0000000001))).AND.
     1ICODE.EQ.2) GO TO 12
      ICODE=2
      KKODE=2
      GO TO 13
   11 KKODE=1
      GO TO 13
   12 KKODE=3
   13 II=I
      CALL MGAUSS(A1,B1,2,ANS3,FUNA,FOFR,2)
      SUM1=SUM1+ANS3(1)
      SUM2=SUM2+ANS3(2)
```

```
    3 A1=B1
      ANSCA(I)=SUM1
      IJ=2*NTHET+1
    1 ANSCA(IJ-I)=SUM2
      KK=2*NTHET
      SUMCA=0.
    4 A=THETA(KK)
      B=THETA(KK-1)
      CALL MGAUSS(A,B,2,CA1,FUNC,FOFO,1)
      SUMCA=SUMCA+CA1
      KK=KK-1
      IF(KK.EQ.(NTHET+1))KK=KK-1
      IF((KK-1).LT.1) GO TO 6
      GO TO 4
    6 CA=SUMCA/57.2958
      AXT(1)=0.
      DO 7 L=2,N
      SUM1=0.
      K=NTHET
      XX=XTAB(L)
    8 A=THETA(K)
      B=THETA(K-1)
      CALL MGAUSS(A,B,1,ANSCN,FUNCN,FOFCN,1)
      SUM1=SUM1+ ANSCN
      IF(THETA(K-1).EQ.90.) GO TO 7
      K=K-1
      GO TO 8
    7 AXT(L)=SUM1
      A=0.
      B=XTAB(N)
      CALL MGAUSS(A,B,10,CNCM,FUCNCM,FOCNCM,2)
      CN=2.*CNCM(1)/(SS*57.2958)
      CM=-2.*CNCM(2)/(SS*LENGTH*57.2958)
      RETURN
      END
```

```
      SUBROUTINE FUNA(RT,FOFR)
      DIMENSION THETPL(10),XTABT(100,10),DELCPT(100,10),XTAB(100),
     1R1(100,10),CP1(100,10),CP2(100,10),THETA(20),ANSCA(20),
     2AXT(100),YA(100),XA(100),FOFR(2),R2(100)
      COMMON NTHET,THETA,ANSCA,THETPL,DELCPT,R1,XX,XTAB,AXT,XTABT,SS,
     1LENGTH,J,YA,XA,N,II,CA,CN,CM,KSTOP3,KSTOP2,KSTOP1,KKODE,R2,CP1,CP2
      GO TO(6009,6005,6004),KKODE
 6009 CALL FTLUP(RT,XTT,+1,KSTOP1,YA,XA)
      GO TO 6006
 6005 KSTOP=KSTOP2-KSTOP1+1
      CALL FTLUP(RT,XTT,-1,KSTOP,YA(KSTOP1),XA(KSTOP1))
      GO TO 6006
 6004 KSTOP=KSTOP3-KSTOP2+1
      CALL FTLUP(RT,XTT,+1,KSTOP,YA(KSTOP2),XA(KSTOP2))
 6006 CALL FTLUP(XTT,CPT,+1,N,XTAB,CP1(1,II))
      CALL FTLUP(XTT,CPTM,+1,N,XTAB,CP2(1,II))
 6007 FOFR(1)=CPT*RT*2./SS
      FOFR(2)=CPTM*RT*2./SS
      RETURN
      END
```

```
      SUBROUTINE FUNCN(THECN,FOFCN)
      DIMENSION THETPL(10),XTABT(100,10),DELCPT(100,10),XTAB(100),
     1R1(100,10),CP1(100,10),CP2(100,10),THETA(20),ANSCA(20),
     2AXT(100),YA(100),XA(100),R2(100)
      COMMON NTHET,THETA,ANSCA,THETPL,DELCPT,R1,XX,XTAB,AXT,XTABT,SS,
     1LENGTH,J,YA,XA,N,II,CA,CN,CM,KSTOP3,KSTOP2,KSTOP1,KKODE,R2,CP1,CP2
      CALL BILUP(XTABT,THETPL,DELCPT,R1,N,NTHET,XX,THECN,DELCP,RCN)
      FOFCN=DELCP*RCN*SIN(THECN/57.2958)
      RETURN
      END



      SUBROUTINE FUNC(THE2,FOFO)
      DIMENSION THETPL(10),XTABT(100,10),DELCPT(100,10),XTAB(100),
     1R1(100,10),CP1(100,10),CP2(100,10),THETA(20),ANSCA(20),
     2AXT(100),YA(100),XA(100),R2(100)
      COMMON NTHET,THETA,ANSCA,THETPL,DELCPT,R1,XX,XTAB,AXT,XTABT,SS,
     1LENGTH,J,YA,XA,N,II,CA,CN,CM,KSTOP3,KSTOP2,KSTOP1,KKODE,R2,CP1,CP2
      NN=2*NTHET
      CALL FTLUP(THE2,CPRR,-1,NN,THETA,ANSCA)
      FOFO=CPRR
      RETURN
      END



      SUBROUTINE FUCNCM(DX,FOCNCM)
      DIMENSION THETPL(10),XTABT(100,10),DELCPT(100,10),XTAB(100),
     1R1(100,10),CP1(100,10),CP2(100,10),THETA(20),ANSCA(20),
     2AXT(100),YA(100),XA(100),FOCNCM(2),R2(100)
      COMMON NTHET,THETA,ANSCA,THETPL,DELCPT,R1,XX,XTAB,AXT,XTABT,SS,
     1LENGTH,J,YA,XA,N,II,CA,CN,CM,KSTOP3,KSTOP2,KSTOP1,KKODE,R2,CP1,CP2
      CALL FTLUP(DX,AXX,1,N,XTAB,AXT)
      FOCNCM(1)=AXX
      FOCNCM(2)=AXX*DX
      RETURN
      END



      SUBROUTINE BILUP(TABI,TABJ,TABIJ,TACIJ,NI,NJ,VALI,VALJ,BVAL1,
     1CVAL1)
C     A TWO DIMENSIONAL TABLE LOOK-UP FOR TWO VARIABLES.
C     INPUT TABLES ARE - TABIJ(I,J) AND TACIJ(I,J) AS FUNCTIONS OF
C     TABI(I) AND TABJ(J).  THE TWO DEPENDENT VARIABLES ARE LINEARLY
C     INTERPOLATED SIMULTANEOUSLY FOR INPUT VALUES OF VALI AND VALJ
C     RESULTING IN ANSWERS BVAL1 AND CVAL1.
C     ERROR SIGNALS ARE GENERATED WHEN THE TABJ(J) TABLE IS EXTRAPOLATED.
      DIMENSION TABJ(10),TABI(100,10),TABIJ(100,10),TACIJ(100,10),
     1TBISL(2),TBIJ1(2),TCIJ1(2)
      TBJSL=0.0
      KK=2
      IF(TABJ(1).LT.TABJ(2)) GO TO 1
      DO 10 J=1,NJ
      IF(VALJ-TABJ(J)) 10,9,11
```

```
    9 TBJSL=1.0
      GO TO 300
   10 CONTINUE
      IF(J.EQ.NJ) WRITE(6,100)
  100 FORMAT(/20X20HHIGH J EXTRAPOLATION)
   11 IF(J.GT.1) GO TO 300
      WRITE(6,101)
  101 FORMAT(/20X19HLOW J EXTRAPOLATION)
      J=2
      GO TO 300
    1 DO 2 J=1,NJ
      IF(VALJ-TABJ(J))3,4,2
    4 TBJSL=1.0
      GO TO 300
    2 CONTINUE
      IF(J.EQ.NJ) WRITE(6,100)
    3 IF(J.GT.1) GO TO 300
      WRITE(6,101)
      J=2
  300 IF(TABI(1,J).GT.TABI(2,J)) GO TO 5
      IF(VALI.LT.TABI(1,J)) GO TO 21
      IF(VALI.GT.TABI(NI,J)) GO TO 24
      DO 20 I=1,NI
      IF(VALI-TABI(I,J)) 22,28,20
   20 CONTINUE
   21 I=2
      GO TO 22
   24 I=NI
      GO TO 22
    5 IF(VALI.GT.TABI(1,J)) GO TO 6
      IF(VALI.LT.TABI(NI,J)) GO TO 7
      DO 8 I=1,NI
      IF(VALI-TABI(I,J)) 8,28,22
    8 CONTINUE
    6 I=2
      GO TO 22
    7 I=NI
      GO TO 22
   28 TBISL(KK)=0.0
      TBIJ1(KK)=TABIJ(I,J)
      TCIJ1(KK)=TACIJ(I,J)
      GO TO 29
   22 TBISL(KK)=(VALI-TABI(I-1,J))/(TABI(I,J)-TABI(I-1,J))
      TBIJ1(KK)=TBISL(KK)*(TABIJ(I,J)-TABIJ(I-1,J))+TABIJ(I-1,J)
      TCIJ1(KK)=TBISL(KK)*(TACIJ(I,J)-TACIJ(I-1,J))+TACIJ(I-1,J)
   29 IF(TBJSL.EQ.0.0) GO TO 26
      BVAL1=TBIJ1(KK)
      CVAL1=TCIJ1(KK)
      GO TO 25
   26 IF(KK.EQ.1) GO TO 23
      KK=KK-1
      J=J-1
      GO TO 300
   23 J=J+1
      TBJSL=(VALJ-TABJ(J-1))/(TABJ(J)-TABJ(J-1))
      BVAL1=TBJSL*(TBIJ1(2)-TBIJ1(1))+TBIJ1(1)
      CVAL1=TBJSL*(TCIJ1(2)-TCIJ1(1))+TCIJ1(1)
   25 RETURN
      END
```

DESCRIPTION OF INPUT DATA

The inputs required for a single case are the body coordinates and a sufficient number of surface-pressure coefficients to describe the pressure variation from the stagnation point to the base of the model along a specified number of meridian lines. A system loading routine (NAMELIST) is used in the program. Except for the specified fixed points, a floating-point (decimal) format is used for the input quantities; and, on the input cards, any column but the first may be used unless otherwise indicated. A description of the required inputs with the name used by the program follows:

Input number	Name	Description
1	ID	Identification card; any identifying information may be written on this card and will appear at the start of each output case (columns 1 to 80)
2	$NUM	Arbitrary name required by the loading routine to define the block of input data (columns 2 to 5)
3	NTHET	Number of meridian lines to be considered in one quadrant, degrees; a second quadrant is automatically considered (fixed-point number, 10 points maximum)
4	THETPL(1)	Array of radial angles defining meridian lines in one quadrant, degrees
5	N	Number of body coordinates (fixed point number, 100 points maximum)
6	XTAB(1)	Body x-coordinate, model units
7	R(1)	Local radius of body of revolution, model units
8	CP1(1,1)	Surface-pressure coefficients for first quadrant; two-dimensional array for 100 body coordinates and 10 radial angles (1000 points required)
9	CP2(1,1)	Surface-pressure coefficients for second quadrant; two-dimensional array for 100 body coordinates and 10 radial angles (1000 points required)
10	SS	Reference area, model units squared
11	LENGTH	Reference length, model units
12	$	Denotes end of case (column 2)

In using the NAMELIST loading routine, one-dimensional arrays need not contain the maximum number of values, but two-dimensional arrays must be filled completely. This routine also requires that two-dimensional arrays be input columnwise. Input cards for using NAMELIST have no special order, and successive cases need contain only the ID card, $NUM card, changed parameters, and a $ card. Following is a listing of the inputs necessary to compute the force and moment coefficients for two sample cases of the model, first at a Mach number of 1.5 and an angle of attack of 0° and then at a Mach number of 3.95 and an angle of attack of 12°:

```
        SAMPLE  CASE  1    MACH NO. = 1.5      ATTACK  ANGLE = 0.
$NUM
 NTHET=5,
 THETPL(1)=90.,67.5,45.,22.5,0.,5*0.,
N=31,
XTAB(1)=.0,.02152,.08547,.18992,.33179,.50685,.70989,.93488,1.1751,1.4219,
  1.6688,2.1626,2.6565,3.1503,3.6442,4.1380,4.6319,5.1257,5.6195,6.1134,6.6072,
          7.1011,7.5949,8.0888,8.5826,9.0765,9.5703,10.064,10.558,11.051,12.125,
 R(1)=.0,.24875,.49012,.71691,.92238,1.1004,1.2457,1.3540,1.4220,1.4619,1.5010,
          1.5792,1.6574,1.7356,1.8138,1.8921,1.9703,2.0485,2.1267,2.2049,2.2832,
          2.3614,2.4396,2.5178,2.5960,2.6742,2.7525,2.8307,2.9089,2.9871,3.1929,
CP1(1,1)=1.5503,1.5018,1.3652,1.1229,.8278,.5678,.2815,.0436,-.1415,-.1415,
-.1018,-.0432,-.0025,.0351,.0517,.0683,.0818,.0863,.0893,.0939,.0984,.1029,
.1000,.1074,.1089,.1104,.1119,.1149,.1134,.1104,.1074,69*.0,
1.5278,1.4754,1.3446,1.1048,.8083,.5511,.2720,.0366,-.1466,-.1466,-.1073,
-.0478,-.0061,.0282,.0461,.0610,.0729,.0789,.0804,.0848,.0908,.0953,.1000,
.1012,.1027,.1027,.1027,.1057,.1027,.1012,.1027,69*.0,
1.5305,1.4778,1.3460,1.1001,.8102,.5554,.2699,.0371,-.1474,-.1474,-.1078,
-.0453,-.0006,.0338,.0502,.0636,.0741,.0800,.0845,.0890,.0935,.1009,.1000,
.1069,.1009,.0994,.1024,.1054,.1039,.1054,.1054,69*.0,
1.5297,1.4773,1.3464,1.1020,.8096,.5521,.2728,.0371,-.1461,-.1461,-.1069,
-.0425,.0021,.0377,.0511,.0630,.0748,.0793,.0852,.0897,.0941,.1016,.1000,
.1030,.1001,.1016,.1016,.1045,.1045,.1045,.1030,69*.0,
1.5291,1.4810,1.3495,1.1042,.8151,.5522,.2719,.0353,-.1487,-.1443,-.1049,
-.0394,.0038,.0365,.0514,.0633,.0752,.0812,.0856,.0886,.0931,.1020,.1000,
.1005,.1020,.1020,.1050,.1065,.1050,.1050,.1020,69*.0,
CP2(1,1)=1.5503,1.5106,1.3697,1.1317,.8586,.5678,.2506,.0524,-.1283,-.1239,
-.0710,-.0328,.0080,.0396,.0578,.0744,.0849,.0925,.0970,.0970,.1000,.1030,
.1076,.1076,.1166,.1181,.1181,.1181,.1121,.1121,.1136,69*.0,
1.5278,1.4929,1.3534,1.1179,.8476,.5554,.2415,.0453,-.1291,-.1291,-.0768,
-.0382,.0066,.0379,.0513,.0677,.0767,.0856,.0946,.0961,.0976,.0976,.1050,.1065,
.1080,.1080,.1080,.1095,.1095,.1110,.1125,69*.0,
1.5305,1.4910,1.3548,1.1132,.8409,.5554,.2479,.0503,-.1342,-.1254,-.0727,
-.0386,.0036,.0322,.0488,.0653,.0729,.0819,.0879,.0894,.0894,.0940,.1015,.1030,
.1015,.1015,.1030,.1060,.1075,.1090,.1105,69*.0,
1.5297,1.4904,1.3551,1.1151,.8445,.5521,.2423,.0502,-.1287,-.1287,-.0720,
-.0363,.0056,.0355,.0505,.0654,.0744,.0834,.0879,.0894,.0909,.0939,.0998,.1013,
.0998,.1013,.1013,.1073,.1058,.1073,.1103,69*.0,
1.5291,1.4897,1.3495,1.1130,.8370,.5522,.2412,.0485,-.1355,-.1268,-.0742,
-.0378,.0058,.0358,.0493,.0643,.0733,.0793,.0868,.0868,.0898,.0913,.0958,.0958,
.0973,.1003,.0988,.1048,.1048,.1063,.1093,69*.0,
SS=31.3310,
LENGTH=12.125,
$
```

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        SAMPLE   CASE  2     MACH NO. = 3.95     ATTACK  ANGLE = 12.
$NUM
CP1(1,1)=1.6039,1.4142,1.1963,.8661,.5756,.3296,.1141,-.0217,-.1201,-.1272,
-.1201,-.0964,-.0777,-.0683,-.0636,-.0589,-.0542,-.0436,-.0343,-.0225,-.0131,
-.0073,-.0038,-.0002,-.0002,-.0002,.0009,.0009,.0009,.0009,.0045,69*.0,
1.6054,1.4268,1.2223,.8933,.5901,.3481,.1318,-.0115,-.1126,-.1196,-.1126,
-.0915,-.0774,-.0680,-.0621,-.0551,-.0492,-.0468,-.0421,-.0374,-.0304,-.0233,
-.0186,-.0139,-.0139,-.0139,-.0116,-.0104,-.0104,-.0092,-.0057,69*.0,
1.6053,1.4527,1.2556,.9504,.6383,.4036,.1759,.0233,-.0893,-.0964,-.0893,-.0716,
-.0633,-.0575,-.0551,-.0516,-.0516,-.0516,-.0528,-.0493,-.0469,-.0457,-.0457,
-.0457,-.0481,-.0481,-.0457,-.0422,-.0410,-.0387,-.0352,69*.0,
1.6088,1.4962,1.3320,1.0482,.7409,.5040,.2530,.0841,-.0402,-.0543,-.0472,
-.0283,-.0236,-.0212,-.0236,-.0236,-.0271,-.0294,-.0318,-.0306,-.0318,-.0330,
-.0377,-.0388,-.0424,-.0435,-.0447,-.0435,-.0470,-.0470,-.0424,69*.0,
1.6067,1.5457,1.4120,1.1657,.8654,.6261,.3563,.1616,.0185,.0044,.0138,.0337,
.0349,.0337,.0314,.0314,.0267,.0232,.0220,.0220,.0220,.0220,.0161,.0138,.0103,
.0079,.0079,.0068,.0044,.0044,.0068,69*.0,
CP2(1,1)=1.6039,1.6765,1.6531,1.5055,1.2783,1.0043,.6997,.4678,.2476,.2312,
.2476,.2620,.2608,.2608,.2561,.2584,.2573,.2573,.2573,.2584,.2561,.2549,.2584,
.2573,.2573,.2573,.2608,.2608,.2643,.2690,.2702,69*.0,
1.6054,1.6736,1.6360,1.4809,1.2482,.9756,.6630,.4444,.2282,.2141,.2235,.2374,
.2386,.2374,.2339,.2339,.2315,.2303,.2303,.2327,.2327,.2303,.2315,.2303,.2315,
.2327,.2327,.2362,.2351,.2362,.2351,69*.0,
1.6053,1.6475,1.5818,1.4011,1.1617,.8871,.5773,.3707,.1712,.1618,.1689,.1814,
.1826,.1826,.1791,.1767,.1744,.1732,.1732,.1744,.1732,.1709,.1720,.1697,.1720,
.1744,.1709,.1720,.1720,.1767,.1767,69*.0,
1.6088,1.6111,1.5056,1.2921,1.0318,.7573,.4641,.2718,.1006,.0865,.1006,.1075,
.1111,.1087,.1052,.1040,.1005,.0993,.0981,.0981,.0946,.0934,.0958,.0923,.0923,
.0887,.0887,.0887,.0887,.0911,.0923,69*.0,
1.6067,1.5621,1.4143,1.1657,.8912,.6097,.3446,.1710,.0255,.0115,.0279,.0341,
.0376,.0376,.0352,.0329,.0294,.0270,.0235,.0235,.0212,.0188,.0176,.0129,.0118,
.0106,.0094,.0094,.0082,.0106,.0118,69*.0,
$
```

DESCRIPTION OF OUTPUT

The program integrates the surface-pressure coefficients by using the Gauss formula to obtain the axial-force, normal-force, and pitching-moment coefficients. The identification card is printed at the beginning of every case, followed by the input body coordinates and surface-pressure coefficients, with the force and moment coefficients completing the case. An output listing for the two example input cases follows:

SAMPLE CASE 1 MACH NO. = 1.5 ATTACK ANGLE = 0.

THETA	ANGLES	90.00	67.50	45.00	22.50	0.00
X	R	1ST QUADRANT SURFACE PRESSURE COEFFICIENTS				
0.0000	0.0000	1.55030	1.52780	1.53050	1.52970	1.52910
.0215	.2488	1.50180	1.47540	1.47780	1.47730	1.48100
.0855	.4901	1.36520	1.34460	1.34600	1.34640	1.34950
.1899	.7169	1.12290	1.10480	1.10010	1.10200	1.10420
.3318	.9224	.82780	.80830	.81020	.80960	.81510
.5069	1.1004	.56780	.55110	.55540	.55210	.55220
.7099	1.2457	.28150	.27200	.26990	.27280	.27190
.9349	1.3540	.04360	.03660	.03710	.03710	.03530
1.1751	1.4220	-.14150	-.14660	-.14740	-.14610	-.14870
1.4219	1.4619	-.14150	-.14660	-.14740	-.14610	-.14430
1.6688	1.5010	-.10180	-.10730	-.10780	-.10690	-.10490
2.1626	1.5792	-.04320	-.04780	-.04530	-.04250	-.03940
2.6565	1.6574	-.00250	-.00610	-.00060	.00210	.00380
3.1503	1.7356	.03510	.02820	.03380	.03770	.03650
3.6442	1.8138	.05170	.04610	.05020	.05110	.05140
4.1380	1.8921	.06830	.06100	.06360	.06300	.06330
4.6319	1.9703	.08180	.07290	.07410	.07480	.07520
5.1257	2.0485	.08630	.07890	.08000	.07930	.08120
5.6195	2.1267	.08930	.08040	.08450	.08520	.08560
6.1134	2.2049	.09390	.08480	.08900	.08970	.08860
6.6072	2.2832	.09840	.09080	.09350	.09410	.09310
7.1011	2.3614	.10290	.09530	.10090	.10160	.10200
7.5949	2.4396	.10000	.10000	.10000	.10000	.10000
8.0888	2.5178	.10740	.10120	.10690	.10300	.10050
8.5826	2.5960	.10890	.10270	.10090	.10010	.10200
9.0765	2.6742	.11040	.10270	.09940	.10160	.10200
9.5703	2.7525	.11190	.10270	.10240	.10160	.10500
10.0640	2.8307	.11490	.10570	.10540	.10450	.10650
10.5580	2.9089	.11340	.10270	.10390	.10450	.10500
11.0510	2.9871	.11040	.10120	.10540	.10450	.10500
12.1250	3.1929	.10740	.10270	.10540	.10300	.10200

THETA	ANGLES	-90.00	-67.50	-45.00	-22.50	-0.00
X	R	2ND QUADRANT SURFACE PRESSURE COEFFICIENTS				
0.0000	0.0000	1.55030	1.52780	1.53050	1.52970	1.52910
.0215	.2488	1.51060	1.49290	1.49100	1.49040	1.48970
.0855	.4901	1.36970	1.35340	1.35480	1.35510	1.34950
.1899	.7169	1.13170	1.11790	1.11320	1.11510	1.11300
.3318	.9224	.85860	.84760	.84090	.84450	.83700
.5069	1.1004	.56780	.55540	.55540	.55210	.55220
.7099	1.2457	.25060	.24150	.24790	.24230	.24120
.9349	1.3540	.05240	.04530	.05030	.05020	.04850
1.1751	1.4220	-.12830	-.12910	-.13420	-.12870	-.13550
1.4219	1.4619	-.12390	-.12910	-.12540	-.12870	-.12680
1.6688	1.5010	-.07100	-.07680	-.07270	-.07200	-.07420
2.1626	1.5792	-.03280	-.03820	-.03860	-.03630	-.03780
2.6565	1.6574	.00800	.00660	.00360	.00560	.00580
3.1503	1.7356	.03960	.03790	.03220	.03550	.03580
3.6442	1.8138	.05780	.05130	.04880	.05050	.04930
4.1380	1.8921	.07440	.06770	.06530	.06540	.06430
4.6319	1.9703	.08490	.07670	.07290	.07440	.07330
5.1257	2.0485	.09250	.08560	.08190	.08340	.07930
5.6195	2.1267	.09700	.09460	.08790	.08790	.08680
6.1134	2.2049	.09700	.09610	.08940	.08940	.08680
6.6072	2.2832	.10000	.09760	.08940	.09090	.08980
7.1011	2.3614	.10300	.09760	.09400	.09390	.09130
7.5949	2.4396	.10760	.10500	.10150	.09980	.09580
8.0888	2.5178	.10760	.10650	.10300	.10130	.09580
8.5826	2.5960	.11660	.10800	.10150	.09980	.09730
9.0765	2.6742	.11810	.10800	.10150	.10130	.10030
9.5703	2.7525	.11810	.10800	.10300	.10130	.09880
10.0640	2.8307	.11810	.10950	.10600	.10730	.10480
10.5580	2.9089	.11210	.10950	.10750	.10580	.10480
11.0510	2.9871	.11210	.11100	.10900	.10730	.10630
12.1250	3.1929	.11360	.11250	.11050	.11030	.10930

REFERENCE AREA= 31.3310 REFERENCE LENGTH= 12.1250

CA= .20527 CN= .00796 CM= -.00392

SAMPLE CASE 2 MACH NO. = 3.95 ATTACK ANGLE = 12.

THETA	ANGLES	90.00	67.50	45.00	22.50	0.00
X	R	1ST QUADRANT SURFACE PRESSURE COEFFICIENTS				
0.0000	0.0000	1.60390	1.60540	1.60530	1.60880	1.60670
.0215	.2488	1.41420	1.42680	1.45270	1.49620	1.54570
.0855	.4901	1.19630	1.22230	1.25560	1.33200	1.41200
.1899	.7169	.86610	.89330	.95040	1.04820	1.16570
.3318	.9224	.57560	.59010	.63830	.74090	.86540
.5069	1.1004	.32960	.34810	.40360	.50400	.62610
.7099	1.2457	.11410	.13180	.17590	.25300	.35630
.9349	1.3540	-.02170	-.01150	.02330	.08410	.16160
1.1751	1.4220	-.12010	-.11260	-.08930	-.04020	.01850
1.4219	1.4619	-.12720	-.11960	-.09640	-.05430	.00440
1.6688	1.5010	-.12010	-.11260	-.08930	-.04720	.01380
2.1626	1.5792	-.09640	-.09150	-.07160	-.02830	.03370
2.6565	1.6574	-.07770	-.07740	-.06330	-.02360	.03490
3.1503	1.7356	-.06830	-.06800	-.05750	-.02120	.03370
3.6442	1.8138	-.06360	-.06210	-.05510	-.02360	.03140
4.1380	1.8921	-.05890	-.05510	-.05160	-.02360	.03140
4.6319	1.9703	-.05420	-.04920	-.05160	-.02710	.02670
5.1257	2.0485	-.04360	-.04680	-.05160	-.02940	.02320
5.6195	2.1267	-.03430	-.04210	-.05280	-.03180	.02200
6.1134	2.2049	-.02250	-.03740	-.04930	-.03060	.02200
6.6072	2.2832	-.01310	-.03040	-.04690	-.03180	.02200
7.1011	2.3614	-.00730	-.02330	-.04570	-.03300	.02200
7.5949	2.4396	-.00380	-.01860	-.04570	-.03770	.01610
8.0888	2.5178	-.00020	-.01390	-.04570	-.03880	.01380
8.5826	2.5960	-.00020	-.01390	-.04810	-.04240	.01030
9.0765	2.6742	-.00020	-.01390	-.04810	-.04350	.00790
9.5703	2.7525	.00090	-.01160	-.04570	-.04470	.00790
10.0640	2.8307	.00090	-.01040	-.04220	-.04350	.00680
10.5580	2.9089	.00090	-.01040	-.04100	-.04700	.00440
11.0510	2.9871	.00090	-.00920	-.03870	-.04700	.00440
12.1250	3.1929	.00450	-.00570	-.03520	-.04240	.00680

THETA ANGLES		-90.00	-67.50	-45.00	-22.50	-0.00
X	R	2ND QUADRANT SURFACE PRESSURE COEFFICIENTS				
0.0000	0.0000	1.60390	1.60540	1.60530	1.60880	1.60670
.0215	.2488	1.67650	1.67360	1.64750	1.61110	1.56210
.0855	.4901	1.65310	1.63600	1.58180	1.50560	1.41430
.1899	.7169	1.50550	1.48090	1.40110	1.29210	1.16570
.3318	.9224	1.27830	1.24820	1.16170	1.03180	.89120
.5069	1.1004	1.00430	.97560	.88710	.75730	.60970
.7099	1.2457	.69970	.66300	.57730	.46410	.34460
.9349	1.3540	.46780	.44440	.37070	.27180	.17100
1.1751	1.4220	.24760	.22820	.17120	.10060	.02550
1.4219	1.4619	.23120	.21410	.16180	.08650	.01150
1.6688	1.5010	.24760	.22350	.16890	.10060	.02790
2.1626	1.5792	.26200	.23740	.18140	.10750	.03410
2.6565	1.6574	.26080	.23860	.18260	.11110	.03760
3.1503	1.7356	.26080	.23740	.18260	.10870	.03760
3.6442	1.8138	.25610	.23390	.17910	.10520	.03520
4.1380	1.8921	.25840	.23390	.17670	.10400	.03290
4.6319	1.9703	.25730	.23150	.17440	.10050	.02940
5.1257	2.0485	.25730	.23030	.17320	.09930	.02700
5.6195	2.1267	.25730	.23030	.17320	.09810	.02350
6.1134	2.2049	.25840	.23270	.17440	.09810	.02350
6.6072	2.2832	.25610	.23270	.17320	.09460	.02120
7.1011	2.3614	.25490	.23030	.17090	.09340	.01880
7.5949	2.4396	.25840	.23150	.17200	.09580	.01760
8.0888	2.5178	.25730	.23030	.16970	.09230	.01290
8.5826	2.5960	.25730	.23150	.17200	.09230	.01180
9.0765	2.6742	.25730	.23270	.17440	.08870	.01060
9.5703	2.7525	.26080	.23270	.17090	.08870	.00940
10.0640	2.8307	.26080	.23620	.17200	.08870	.00940
10.5580	2.9089	.26430	.23510	.17200	.08870	.00820
11.0510	2.9871	.26900	.23620	.17670	.09110	.01060
12.1250	3.1929	.27020	.23510	.17670	.09230	.01180

REFERENCE AREA= 31.3310   REFERENCE LENGTH= 12.1250

CA= .21427   CN= .40508   CM= -.21914

REFERENCES

1. Jackson, Charlie M., Jr.; Sawyer, Wallace C.; and Smith, Rudeen S.: A Method for Determining Surface Pressures on Blunt Bodies of Revolution at Small Angles of Attack in Supersonic Flow. NASA TN D-4865, 1968.
2. Mechtly, E. A.: The International System of Units – Physical Constants and Conversion Factors. NASA SP-7012, 1964.

TABLE I.- SURFACE-PRESSURE COEFFICIENTS AT $M_\infty = 1.50$

(a) $\alpha = 0°$

Orifice station, s/l	C_p at meridian angle, θ, deg = 90	67.5	45	22.5	0	270	247.5	225	202.5	180	Orifice station, s/l
.0000	1.5503	1.5278	1.5305	1.5297	1.5291	1.5503	1.5278	1.5305	1.5297	1.5291	.0000
.0206	1.5018	1.4754	1.4778	1.4773	1.4810	1.5106	1.4929	1.4910	1.4904	1.4897	.0206
.0412	1.3652	1.3446	1.3460	1.3464	1.3495	1.3697	1.3534	1.3548	1.3551	1.3495	.0412
.0619	1.1229	1.1048	1.1001	1.1020	1.1042	1.1317	1.1179	1.1132	1.1151	1.1130	.0619
.0825	.8278	.8083	.8102	.8096	.8151	.8586	.8476	.8409	.8445	.8370	.0825
.1031	.5678	.5511	.5554	.5521	.5522	.5678	.5554	.5554	.5521	.5522	.1031
.1237	.2815	.2720	.2699	.2728	.2719	.2506	.2415	.2479	.2423	.2412	.1237
.1443	.0436	.0366	.0371	.0371	.0353	.0524	.0453	.0503	.0502	.0485	.1443
.1649	-.1415	-.1466	-.1474	-.1461	-.1487	-.1283	-.1291	-.1342	-.1287	-.1355	.1649
.1856	-.1415	-.1466	-.1474	-.1461	-.1443	-.1239	-.1291	-.1254	-.1287	-.1268	.1856
.2062	-.1018	-.1073	-.1078	-.1069	-.1049	-.0710	-.0768	-.0727	-.0720	-.0742	.2062
.2474	-.0432	-.0478	-.0453	-.0425	-.0394	-.0328	-.0382	-.0386	-.0363	-.0378	.2474
.2887	-.0025	-.0061	-.0006	.0021	.0038	.0080	.0066	.0036	.0056	.0058	.2887
.3299	.0351	.0282	.0338	.0377	.0365	.0396	.0379	.0322	.0355	.0358	.3299
.3711	.0517	.0461	.0502	.0511	.0514	.0578	.0513	.0488	.0505	.0493	.3711
.4124	.0683	.0610	.0636	.0630	.0633	.0744	.0677	.0653	.0654	.0643	.4124
.4536	.0818	.0729	.0741	.0748	.0752	.0849	.0767	.0729	.0744	.0733	.4536
.4948	.0863	.0789	.0800	.0793	.0812	.0925	.0856	.0819	.0834	.0793	.4948
.5361	.0893	.0804	.0845	.0852	.0856	.0970	.0946	.0879	.0879	.0868	.5361
.5773	.0939	.0848	.0890	.0897	.0886	.0970	.0961	.0894	.0894	.0868	.5773
.6186	.0984	.0908	.0935	.0941	.0931	.1000	.0976	.0894	.0909	.0898	.6186
.6598	.1029	.0953	.1009	.1016	.1020	.1030	.0976	.0940	.0939	.0913	.6598
.7010						.1076	.1050	.1015	.0998	.0958	.7010
.7423	.1074	.1012	.1069	.1030	.1005	.1076	.1065	.1030	.1013	.0958	.7423
.7835	.1089	.1027	.1009	.1001	.1020	.1166	.1080	.1015	.0998	.0973	.7835
.8247	.1104	.1027	.0994	.1016	.1020	.1181	.1080	.1015	.1013	.1003	.8247
.8660	.1119	.1027	.1024	.1016	.1050	.1181	.1080	.1030	.1013	.0988	.8660
.9072	.1149	.1057	.1054	.1045	.1065	.1181	.1095	.1060	.1073	.1048	.9072
.9485	.1134	.1027	.1039	.1045	.1050	.1121	.1095	.1075	.1058	.1048	.9485
.9897	.1104	.1012	.1054	.1045	.1050	.1121	.1110	.1090	.1073	.1063	.9897
1.0309	.1074	.1027	.1054	.1030	.1020	.1136	.1125	.1105	.1103	.1093	1.0309

(b) $\alpha = 4°$

Orifice station, s/l	C_p at meridian angle, θ, deg = 90	67.5	45	22.5	0	270	247.5	225	202.5	180	Orifice station, s/l
.0000	1.5252	1.5241	1.5227	1.5302	1.5244	1.5252	1.5241	1.5227	1.5302	1.5244	.0000
.0206	1.4292	1.4325	1.4392	1.4561	1.4719	1.5208	1.5197	1.5095	1.5040	1.4850	.0206
.0412	1.2677	1.2711	1.2854	1.3123	1.3405	1.4205	1.4150	1.3996	1.3777	1.3448	.0412
.0619	.9928	1.0051	1.0173	1.0597	1.0996	1.2110	1.2057	1.1799	1.1512	1.1039	.0619
.0825	.6917	.6997	.7185	.7634	.8061	.9579	.9484	.9250	.8854	.8368	.0825
.1031	.4430	.4555	.4680	.5064	.5477	.6786	.6648	.6394	.5979	.5477	.1031
.1237	.1593	.1676	.1912	.2276	.2674	.3644	.3508	.3274	.2930	.2455	.1237
.1443	-.0545	-.0461	-.0285	.0055	.0352	.1549	.1458	.1209	.0926	.0527	.1443
.1649	-.2160	-.2118	-.1955	-.1688	-.1444	-.0502	-.0548	-.0725	-.0947	-.1268	.1649
.1856	-.2160	-.2118	-.1955	-.1688	-.1400	-.0414	-.0505	-.0681	-.0904	-.1268	.1856
.2062	-.1854	-.1769	-.1603	-.1339	-.1049	.0109	.0019	-.0153	-.0381	-.0699	.2062
.2474	-.1254	-.1183	-.0997	-.0717	-.0388	.0609	.0471	.0265	-.0016	-.0370	.2474
.2887	-.0837	-.0766	-.0594	-.0332	-.0016	.0983	.0859	.0656	.0387	.0019	.2887
.3299	-.0420	-.0378	-.0280	-.0050	.0223	.1208	.1112	.0867	.0597	.0274	.3299
.3711	-.0152	-.0096	-.0025	.0143	.0372	.1313	.1217	.0972	.0731	.0424	.3711
.4124	.0072	.0098	.0169	.0306	.0491	.1417	.1306	.1077	.0836	.0544	.4124
.4536	.0251	.0247	.0318	.0394	.0565	.1462	.1366	.1167	.0880	.0649	.4536
.4948	.0355	.0366	.0393	.0498	.0640	.1477	.1381	.1182	.0910	.0664	.4948
.5361	.0429	.0440	.0468	.0572	.0670	.1462	.1411	.1212	.0925	.0709	.5361
.5773	.0504	.0515	.0558	.0617	.0714	.1492	.1411	.1227	.0955	.0754	.5773
.6186	.0578	.0574	.0632	.0676	.0804	.1492	.1411	.1242	.0970	.0769	.6186
.6598	.0653	.0649	.0707	.0780	.0908	.1507	.1426	.1242	.1000	.0799	.6598
.7010						.1537	.1485	.1303	.1089	.0859	.7010
.7423	.0712	.0723	.0692	.0780	.0908	.1537	.1485	.1318	.1060	.0814	.7423
.7835	.0712	.0694	.0677	.0765	.0893	.1582	.1500	.1288	.1060	.0859	.7835
.8247	.0712	.0694	.0692	.0765	.0908	.1582	.1500	.1318	.1075	.0874	.8247
.8660	.0712	.0694	.0707	.0780	.0908	.1552	.1500	.1318	.1119	.0903	.8660
.9072	.0727	.0708	.0737	.0809	.0923	.1567	.1515	.1333	.1134	.0918	.9072
.9485	.0712	.0708	.0737	.0809	.0908	.1537	.1485	.1348	.1134	.0948	.9485
.9897	.0698	.0723	.0737	.0795	.0908	.1537	.1485	.1363	.1149	.0948	.9897
1.0309	.0698	.0723	.0737	.0795	.0863	.1597	.1515	.1363	.1194	.0978	1.0309

TABLE I.- SURFACE-PRESSURE COEFFICIENTS AT M_∞ = 1.50 - Concluded

(c) α = 8°

Orifice station, s/l	C_p at meridian angle, θ, deg = 90	67.5	45	22.5	0	270	247.5	225	202.5	180	Orifice station, s/l
.0000	1.4974	1.5018	1.5009	1.4949	1.5064	1.4974	1.5018	1.5009	1.4949	1.5064	.0000
.0206	1.3622	1.3710	1.3866	1.4118	1.4495	1.5279	1.5279	1.5097	1.4862	1.4714	.0206
.0412	1.1791	1.1878	1.2108	1.2587	1.3225	1.4669	1.4625	1.4262	1.3768	1.3313	.0412
.0619	.8782	.8956	.9384	1.0051	1.0817	1.2968	1.2837	1.2372	1.1713	1.0992	.0619
.0825	.5686	.5817	.6263	.6989	.7970	1.0657	1.0483	.9955	.9132	.8277	.0825
.1031	.3419	.3506	.3890	.4584	.5474	.7866	.7692	.7142	.6333	.5431	.1031
.1237	.0584	.0715	.1122	.1785	.2628	.4858	.4683	.4110	.3316	.2453	.1237
.1443	-.1291	-.1204	-.0900	-.0358	.0351	.2634	.2459	.1957	.1260	.0526	.1443
.1649	-.2774	-.2686	-.2438	-.2020	-.1488	.0410	.0235	-.0153	-.0708	-.1269	.1649
.1856	-.2774	-.2686	-.2438	-.2020	-.1401	.0541	.0366	-.0021	-.0620	-.1269	.1856
.2062	-.2425	-.2337	-.2130	-.1626	-.1007	.1107	.0933	.0506	-.0052	-.0744	.2062
.2474	-.1868	-.1809	-.1520	-.1067	-.0411	.1677	.1432	.0957	.0316	-.0395	.2474
.2887	-.1571	-.1437	-.1131	-.0725	-.0083	.1976	.1731	.1288	.0631	-.0020	.2887
.3299	-.1020	-.1094	-.0817	-.0457	.0125	.2125	.1925	.1454	.0856	.0175	.3299
.3711	-.0678	-.0752	-.0608	-.0323	.0229	.2155	.1955	.1499	.0901	.0280	.3711
.4124	-.0395	-.0350	-.0429	-.0189	.0333	.2155	.1955	.1499	.0916	.0355	.4124
.4536	-.0157	-.0112	-.0234	-.0085	.0363	.2140	.1955	.1499	.0916	.0430	.4536
.4948	.0052	.0052	-.0010	.0049	.0437	.2140	.1955	.1514	.0916	.0430	.4948
.5361	.0201	.0171	.0065	.0064	.0497	.2125	.1940	.1499	.0931	.0535	.5361
.5773	.0305	.0260	.0139	.0108	.0542	.2125	.1940	.1499	.0931	.0535	.5773
.6186	.0364	.0335	.0184	.0094	.0527	.2125	.1985	.1514	.0946	.0505	.6186
.6598	.0424	.0379	.0229	.0183	.0527	.2155	.1985	.1514	.0946	.0520	.6598
.7010						.2185	.2015	.1529	.0946	.0565	.7010
.7423	.0454	.0409	.0289	.0242	.0586	.2170	.2000	.1544	.0946	.0565	.7423
.7835	.0424	.0394	.0289	.0227	.0571	.2125	.1985	.1559	.0960	.0595	.7835
.8247	.0439	.0409	.0319	.0257	.0586	.2125	.1985	.1559	.0975	.0610	.8247
.8660	.0454	.0424	.0349	.0302	.0616	.2095	.1970	.1544	.0975	.0640	.8660
.9072	.0484	.0469	.0394	.0361	.0646	.2110	.1970	.1559	.0975	.0640	.9072
.9485	.0498	.0469	.0394	.0332	.0631	.2110	.1940	.1559	.0960	.0655	.9485
.9897	.0484	.0469	.0394	.0376	.0616	.2110	.1955	.1544	.0990	.0655	.9897
1.0309	.0469	.0454	.0394	.0406	.0631	.2125	.1985	.1559	.1005	.0715	1.0309

(d) α = 12°

Orifice station, s/l	C_p at meridian angle, θ, deg = 90	67.5	45	22.5	0	270	247.5	225	202.5	180	Orifice station, s/l
.0000	1.4649	1.4635	1.4620	1.4629	1.4631	1.4649	1.4635	1.4620	1.4629	1.4631	.0000
.0206	1.2907	1.2977	1.3169	1.3622	1.4061	1.5303	1.5245	1.4972	1.4629	1.4280	.0206
.0412	1.0903	1.1014	1.1367	1.2001	1.2835	1.5085	1.4940	1.4444	1.3710	1.2922	.0412
.0619	.7723	.7873	.8421	.9374	1.0514	1.3778	1.3500	1.2817	1.1783	1.0645	.0619
.0825	.4629	.4732	.5344	.6396	.7710	1.1643	1.1363	1.0532	.9330	.8017	.0825
.1031	.2277	.2463	.3102	.4031	.5301	.8986	.8745	.7894	.6615	.5258	.1031
.1237	-.0250	-.0111	.0421	.1271	.2454	.6111	.5779	.4949	.3680	.2367	.1237
.1443	-.1993	-.1856	-.1470	-.0743	.0264	.3758	.3467	.2707	.1622	.0483	.1443
.1649	-.3300	-.3208	-.2920	-.2320	-.1487	.1362	.1111	.0509	-.0393	-.1312	.1649
.1856	-.3169	-.3208	-.2920	-.2320	-.1487	.1623	.1329	.0640	-.0262	-.1268	.1856
.2062	-.2777	-.2859	-.2569	-.1926	-.1049	.2320	.1983	.1256	.0308	-.0699	.2062
.2474	-.2612	-.2386	-.2032	-.1378	-.0477	.2868	.2521	.1760	.0715	-.0385	.2474
.2887	-.2106	-.1986	-.1658	-.1065	-.0194	.3078	.2716	.1971	.1015	-.0025	.2887
.3299	-.1510	-.1614	-.1345	-.0872	-.0090	.3078	.2701	.2031	.1030	-.0010	.3299
.3711	-.1123	-.1199	-.1150	-.0812	-.0090	.3018	.2686	.1986	.1000	-.0025	.3711
.4124	-.0676	-.0857	-.1001	-.0708	-.0030	.3003	.2671	.1941	.1000	-.0025	.4124
.4536	-.0274	-.0293	-.0852	-.0723	-.0075	.2973	.2656	.1911	.0940	-.0025	.4536
.4948	.0009	-.0160	-.0747	-.0723	-.0105	.2973	.2656	.1941	.0985	-.0055	.4948
.5361	.0128	-.0071	-.0657	-.0738	-.0164	.2973	.2641	.1896	.0940	-.0085	.5361
.5773	.0172	.0018	-.0538	-.0738	-.0194	.2958	.2641	.1835	.0895	-.0115	.5773
.6186	.0202	.0078	-.0418	-.0738	-.0209	.2898	.2566	.1835	.0805	-.0190	.6186
.6598	.0247	.0137	-.0299	-.0708	-.0209	.2883	.2566	.1805	.0820	-.0190	.6598
.7010						.2854	.2521	.1820	.0805	-.0190	.7010
.7423	.0292	.0226	-.0149	-.0574	-.0239	.2839	.2506	.1805	.0775	-.0205	.7423
.7835	.0321	.0226	-.0120	-.0529	-.0269	.2824	.2491	.1805	.0745	-.0190	.7835
.8247	.0321	.0241	-.0090	-.0470	-.0313	.2824	.2491	.1790	.0745	-.0175	.8247
.8660	.0336	.0241	-.0045	-.0336	-.0284	.2824	.2491	.1775	.0730	-.0160	.8660
.9072	.0351	.0271	.0015	-.0232	-.0194	.2839	.2491	.1775	.0760	-.0115	.9072
.9485	.0336	.0271	.0015	-.0262	-.0194	.2794	.2491	.1775	.0805	-.0115	.9485
.9897	.0351	.0256	-.0045	-.0321	-.0209	.2809	.2476	.1805	.0880	-.0115	.9897
1.0309	.0351	.0196	-.0060	-.0291	-.0179	.2809	.2506	.1926	.0805	-.0100	1.0309

TABLE II.- SURFACE-PRESSURE COEFFICIENTS AT $M_{\infty} = 1.90$

(a) $\alpha = 0°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6306	1.6315	1.6310	1.6425	1.6283	1.6306	1.6315	1.6310	1.6425	1.6283	.0000
.0206	1.5751	1.5760	1.5755	1.5873	1.5955	1.5915	1.5923	1.5919	1.6003	1.5857	.0206
.0412	1.4414	1.4389	1.4417	1.4637	1.4547	1.4446	1.4454	1.4450	1.4605	1.4383	.0412
.0619	1.1901	1.1843	1.1839	1.1939	1.1861	1.1999	1.2006	1.2002	1.2102	1.1927	.0619
.0825	.8899	.8872	.8869	.8948	.8881	.9291	.9296	.9293	.9306	.9208	.0825
.1031	.6354	.6358	.6356	.6510	.6359	.6452	.6456	.6454	.6478	.6392	.1031
.1237	.3548	.3518	.3549	.3617	.3641	.3385	.3388	.3386	.3390	.3281	.1237
.1443	.1394	.1364	.1363	.1472	.1381	.1459	.1494	.1493	.1504	.1414	.1443
.1649	-.0270	-.0268	-.0269	-.0219	-.0256	-.0172	-.0171	-.0171	-.0089	-.0224	.1649
.1856	-.0368	-.0366	-.0367	-.0316	-.0387	-.0237	-.0236	-.0204	-.0154	-.0256	.1856
.2062		-.0203	-.0171	-.0154	-.0224	.0089	.0091	.0090	.0171	.0038	.2062
.2474	.0128	.0115	.0126	.0164	.0073	.0213	.0221	.0237	.0204	.0126	.2474
.2887	.0306	.0304	.0304	.0364	.0294	.0369	.0388	.0393	.0406	.0394	.2887
.3299	.0461	.0459	.0470	.0497	.0394	.0514	.0511	.0516	.0518	.0450	.3299
.3711	.0528	.0526	.0515	.0563	.0493	.0570	.0578	.0583	.0585	.0629	.3711
.4124	.0628	.0615	.0615	.0663	.0538	.0648	.0657	.0650	.0675	.0584	.4124
.4536	.0683	.0681	.0681	.0707	.0604	.0715	.0712	.0718	.0709	.0617	.4536
.4948	.0717	.0704	.0715	.0752	.0626	.0726	.0724	.0729	.0742	.0640	.4948
.5361	.0739	.0726	.0748	.0807	.0704	.0760	.0768	.0785	.0854	.0751	.5361
.5773	.0750	.0748	.0770	.0796	.0737	.0760	.0768	.0785	.0810	.0807	.5773
.6186	.0772	.0792	.0792	.0807	.0704	.0771	.0768	.0818	.0798	.0718	.6186
.6598	.0828	.0837	.0826	.0851	.0737	.0782	.0824	.0818	.0832	.0718	.6598
.7010						.0815	.0824	.0818	.0888	.0751	.7010
.7423	.0861	.0859	.0892	.0940	.0792	.0815	.0824	.0818	.0854	.0740	.7423
.7835	.0839	.0859	.0870	.0873	.0759	.0838	.0835	.0818	.0832	.0774	.7835
.8247	.0850	.0870	.0848	.0862	.0759	.0849	.0835	.0818	.0843	.0774	.8247
.8660	.0883	.0881	.0870	.0873	.0759	.0849	.0847	.0852	.0821	.0751	.8660
.9072	.0927	.0903	.0892	.0851	.0770	.0849	.0858	.0852	.0787	.0729	.9072
.9485	.0939	.0903	.0848	.0918	.0770	.0882	.0880	.0841	.0944	.0785	.9485
.9897	.0939	.0914	.0848	.0918	.0792	.0893	.0880	.0841	.0955	.0829	.9897
1.0309	.0916	.0903	.0881	.0929	.0825	.0893	.0880	.0930	.0955	.0863	1.0309

(b) $\alpha = 4°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6254	1.6253	1.6240	1.6254	1.6465	1.6254	1.6253	1.6240	1.6254	1.6465	.0000
.0206	1.5242	1.5241	1.5326	1.5505	1.5812	1.6221	1.6188	1.6109	1.5993	1.5877	.0206
.0412	1.3544	1.3608	1.3760	1.4041	1.4211	1.5144	1.5110	1.4935	1.4692	1.4276	.0412
.0619	1.0768	1.0833	1.1019	1.1437	1.1760	1.3021	1.2955	1.2716	1.2381	1.1825	.0619
.0825	.7634	.7699	.7952	.8378	.8754	1.0442	1.0343	1.0073	.9680	.9081	.0825
.1031	.5283	.5315	.5505	.5872	.6270	.7601	.7503	.7202	.6783	.6238	.1031
.1237	.2475	.2573	.2699	.3073	.3460	.4499	.4401	.4135	.3756	.3264	.1237
.1443	.0549	.0614	.0741	.1055	.1336	.2442	.2377	.2144	.1868	.1402	.1443
.1649	-.0888	-.0823	-.0727	-.0507	-.0298	.0581	.0516	.0382	.0111	-.0232	.1649
.1856	-.0986	-.0921	-.0825	-.0605	-.0363	.0516	.0483	.0317	.0078	-.0265	.1856
.2062	-.0823	-.0758	-.0662	-.0442	-.0232	.0842	.0810	.0611	.0371	.0062	.2062
.2474	-.0527	-.0494	-.0396	-.0134	.0048	.1015	.0959	.0762	.0467	.0134	.2474
.2887	-.0317	-.0283	-.0163	.0054	.0214	.1138	.1104	.0919	.0689	.0300	.2887
.3299	-.0128	-.0106	-.0029	.0165	.0313	.1216	.1171	.0997	.0745	.0389	.3299
.3711	-.0017	.0005	.0070	.0265	.0368	.1249	.1194	.1075	.0812	.0466	.3711
.4124	.0116	.0127	.0181	.0342	.0445	.1305	.1250	.1097	.0845	.0510	.4124
.4536	.0205	.0216	.0248	.0387	.0478	.1305	.1261	.1119	.0879	.0532	.4536
.4948	.0272	.0283	.0303	.0431	.0489	.1305	.1272	.1130	.0890	.0555	.4948
.5361	.0305	.0316	.0348	.0453	.0522	.1327	.1283	.1142	.0912	.0588	.5361
.5773	.0349	.0371	.0392	.0453	.0556	.1327	.1272	.1142	.0912	.0687	.5773
.6186	.0394	.0394	.0425	.0509	.0578	.1327	.1250	.1153	.0901	.0709	.6186
.6598	.0449	.0438	.0503	.0608	.0589	.1350	.1317	.1153	.0901	.0665	.6598
.7010						.1350	.1317	.1153	.0912	.0632	.7010
.7423	.0483	.0505	.0559	.0631	.0710	.1350	.1294	.1130	.0923	.0632	.7423
.7835	.0505	.0516	.0525	.0619	.0655	.1361	.1294	.1130	.0957	.0665	.7835
.8247	.0538	.0527	.0525	.0597	.0633	.1361	.1294	.1142	.0923	.0654	.8247
.8660	.0594	.0549	.0536	.0597	.0633	.1350	.1305	.1142	.0935	.0632	.8660
.9072	.0616	.0582	.0525	.0631	.0644	.1361	.1305	.1153	.0923	.0621	.9072
.9485	.0616	.0582	.0536	.0631	.0644	.1383	.1328	.1153	.0968	.0709	.9485
.9897	.0605	.0571	.0581	.0664	.0666	.1394	.1328	.1153	.1024	.0743	.9897
1.0309	.0594	.0571	.0603	.0675	.0710	.1383	.1328	.1242	.1068	.0787	1.0309

TABLE II.- SURFACE-PRESSURE COEFFICIENTS AT M_∞ = 1.90 - Concluded

(c) α = 8°

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.5990	1.5995	1.5979	1.5950	1.5858	1.5990	1.5995	1.5979	1.5950	1.5858	.0000
.0206	1.4554	1.4591	1.4771	1.4976	1.5336	1.6317	1.6289	1.6142	1.5820	1.5467	.0206
.0412	1.2660	1.2729	1.3042	1.3450	1.3965	1.5729	1.5636	1.5294	1.4716	1.4030	.0412
.0619	.9624	.9758	1.0203	1.0754	1.1549	1.3966	1.3807	1.3303	1.2540	1.1647	.0619
.0825	.6523	.6623	.7006	.7701	.8578	1.1550	1.1358	1.0791	.9910	.8905	.0825
.1031	.4139	.4239	.4722	.5331	.6130	.8775	.8550	.7985	.7117	.6097	.1031
.1237	.1560	.1659	.2046	.2603	.3355	.5641	.5447	.4918	.4129	.3192	.1237
.1443	-.0137	-.0039	.0219	.0687	.1266	.3486	.3325	.2862	.2181	.1397	.1443
.1649	-.1411	-.1312	-.1119	-.0742	-.0301	.1397	.1268	.0904	.0394	-.0203	.1649
.1856	-.1476	-.1410	-.1216	-.0840	-.0399	.1364	.1235	.0839	.0329	-.0268	.1856
.2062	-.1345	-.1280	-.1053	-.0710	-.0236	.1691	.1496	.1133	.0654	.0058	.2062
.2474	-.1046	-.0979	-.0773	-.0423	.0027	.1846	.1693	.1293	.0736	.0110	.2474
.2887	-.0802	-.0757	-.0584	-.0235	.0148	.1991	.1827	.1461	.0902	.0243	.2887
.3299	-.0624	-.0579	-.0440	-.0124	.0225	.2024	.1872	.1483	.0958	.0320	.3299
.3711	-.0446	-.0434	-.0329	-.0080	.0247	.2013	.1872	.1483	.0980	.0342	.3711
.4124	-.0291	-.0323	-.0229	-.0025	.0291	.2013	.1872	.1483	.0958	.0353	.4124
.4536	-.0180	-.0223	-.0196	-.0025	.0280	.2002	.1872	.1483	.0958	.0364	.4536
.4948	-.0091	-.0123	-.0118	.0019	.0280	.2002	.1861	.1483	.0958	.0364	.4948
.5361	-.0024	-.0045	-.0029	.0063	.0291	.1991	.1861	.1483	.0958	.0364	.5361
.5773	.0065	.0066	.0026	.0107	.0325	.1991	.1861	.1472	.0958	.0397	.5773
.6186	.0142	.0121	.0048	.0119	.0336	.1980	.1849	.1461	.0958	.0342	.6186
.6598	.0231	.0210	.0070	.0130	.0369	.2002	.1861	.1427	.0946	.0364	.6598
.7010						.2002	.1849	.1427	.0913	.0364	.7010
.7423	.0309	.0244	.0104	.0130	.0336	.1991	.1827	.1427	.0913	.0320	.7423
.7835	.0309	.0255	.0104	.0074	.0280	.1991	.1838	.1472	.0924	.0309	.7835
.8247	.0320	.0277	.0093	.0096	.0280	.1980	.1838	.1461	.0891	.0287	.8247
.8660	.0331	.0277	.0148	.0141	.0291	.1991	.1849	.1450	.0880	.0353	.8660
.9072	.0354	.0310	.0204	.0185	.0314	.1991	.1849	.1427	.0958	.0386	.9072
.9485	.0331	.0322	.0226	.0196	.0336	.1969	.1827	.1450	.0958	.0386	.9485
.9897	.0309	.0333	.0248	.0207	.0358	.1980	.1827	.1495	.0991	.0397	.9897
1.0309	.0309	.0333	.0270	.0196	.0358	.1991	.1816	.1506	.0991	.0430	1.0309

(d) α = 12°

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.5592	1.5605	1.5594	1.5728	1.5692	1.5592	1.5605	1.5594	1.5728	1.5692	.0000
.0206	1.3764	1.3809	1.4125	1.4782	1.5072	1.6310	1.6258	1.6051	1.5662	1.5137	.0206
.0412	1.1675	1.1817	1.2232	1.2892	1.3603	1.6146	1.5964	1.5463	1.4717	1.3766	.0412
.0619	.8444	.8649	.9262	1.0187	1.1318	1.4743	1.4495	1.3798	1.2762	1.1416	.0619
.0825	.5442	.5546	.6096	.7156	.8348	1.2556	1.2274	1.1416	1.0187	.8805	.0825
.1031	.2994	.3195	.3811	.4875	.5965	.9880	.9629	.8707	.7482	.5998	.1031
.1237	.0710	.0876	.1396	.2300	.3224	.6845	.6591	.5704	.4484	.3191	.1237
.1443	-.0759	-.0659	-.0269	.0410	.1200	.4561	.4305	.3550	.2528	.1428	.1443
.1649	-.1869	-.1802	-.1477	-.0959	-.0334	.2276	.2052	.1461	.0638	-.0204	.1649
.1856	-.1934	-.1867	-.1575	-.1057	-.0400	.2276	.2019	.1428	.0671	-.0236	.1856
.2062	-.1803	-.1704	-.1477	-.0926	-.0236	.2635	.2346	.1755	.0931	.0025	.2062
.2474	-.1392	-.1367	-.1160	-.0632	.0010	.2878	.2544	.1938	.1081	.0110	.2474
.2887	-.1236	-.1190	-.0983	-.0499	.0121	.2900	.2622	.2016	.1215	.0210	.2887
.3299	-.1092	-.1012	-.0838	-.0432	.0132	.2900	.2622	.2016	.1215	.0232	.3299
.3711	-.0836	-.0867	-.0761	-.0421	.0087	.2866	.2600	.1994	.1237	.0210	.3711
.4124	-.0614	-.0734	-.0716	-.0421	.0087	.2855	.2600	.1994	.1114	.0176	.4124
.4536	-.0459	-.0623	-.0639	-.0399	.0054	.2844	.2555	.1938	.1070	.0143	.4536
.4948	-.0292	-.0434	-.0594	-.0421	.0087	.2844	.2555	.1938	.1059	.0176	.4948
.5361	-.0148	-.0223	-.0605	-.0466	.0032	.2833	.2533	.1915	.1047	.0099	.5361
.5773	.0008	-.0178	-.0583	-.0443	.0043	.2822	.2533	.1859	.1148	.0176	.5773
.6186	.0074	-.0134	-.0561	-.0521	-.0012	.2766	.2499	.1848	.1003	.0088	.6186
.6598	.0119	-.0056	-.0516	-.0532	-.0056	.2766	.2499	.1859	.0947	-.0023	.6598
.7010						.2766	.2499	.1871	.0902	-.0023	.7010
.7423	.0163	.0011	-.0405	-.0510	-.0023	.2766	.2477	.1848	.0924	.0010	.7423
.7835	.0141	.0044	-.0339	-.0510	-.0078	.2755	.2477	.1848	.0958	.0055	.7835
.8247	.0130	.0055	-.0283	-.0499	-.0056	.2744	.2477	.1848	.0980	.0032	.8247
.8660	.0163	.0089	-.0239	-.0521	-.0056	.2721	.2443	.1859	.0924	-.0012	.8660
.9072	.0196	.0100	-.0195	-.0521	-.0078	.2721	.2465	.1859	.0936	-.0045	.9072
.9485	.0196	.0100	-.0172	-.0543	-.0111	.2732	.2521	.1893	.0902	-.0034	.9485
.9897	.0196	.0100	-.0172	-.0488	-.0144	.2755	.2555	.1904	.1025	-.0056	.9897
1.0309	.0196	.0089	-.0161	-.0466	-.0144	.2799	.2555	.1915	.0958	-.0045	1.0309

TABLE III.- SURFACE-PRESSURE COEFFICIENTS AT $M_\infty = 2.30$

(a) $\alpha = 0°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6805	1.6888	1.6818	1.6832	1.6845	1.6805	1.6888	1.6818	1.6832	1.6845	.0000
.0206	1.6219	1.6277	1.6277	1.6270	1.6281	1.6383	1.6441	1.6418	1.6363	1.6352	.0206
.0412	1.4765	1.4844	1.4845	1.4863	1.4897	1.4812	1.4844	1.4821	1.4745	1.4756	.0412
.0619	1.2163	1.2237	1.2238	1.2260	1.2269	1.2257	1.2237	1.2214	1.2166	1.2128	.0619
.0825	.9092	.9160	.9161	.9165	.9172	.9467	.9466	.9419	.9352	.9336	.0825
.1031	.6630	.6671	.6671	.6702	.6708	.6583	.6577	.6554	.6468	.6450	.1031
.1237	.3723	.3782	.3806	.3842	.3846	.3653	.3641	.3571	.3537	.3517	.1237
.1443	.1754	.1762	.1762	.1802	.1804	.1824	.1856	.1762	.1755	.1734	.1443
.1649	.0207	.0235	.0235	.0254	.0279	.0300	.0282	.0259	.0254	.0209	.1649
.1856	.0066	.0094	.0071	.0113	.0115	.0160	.0118	.0118	.0113	.0068	.1856
.2062	.0160	.0188	.0188	.0207	.0209	.0324	.0282	.0259	.0254	.0256	.2062
.2474	.0336	.0352	.0352	.0351	.0396	.0398	.0391	.0355	.0346	.0333	.2474
.2887	.0395	.0411	.0422	.0421	.0455	.0468	.0461	.0437	.0416	.0403	.2887
.3299	.0453	.0469	.0469	.0468	.0490	.0515	.0496	.0484	.0463	.0462	.3299
.3711	.0465	.0469	.0481	.0480	.0490	.0539	.0532	.0508	.0499	.0486	.3711
.4124	.0488	.0516	.0516	.0515	.0525	.0562	.0543	.0543	.0522	.0509	.4124
.4536	.0512	.0516	.0528	.0538	.0549	.0586	.0567	.0555	.0534	.0533	.4536
.4948	.0523	.0528	.0540	.0562	.0572	.0586	.0579	.0567	.0534	.0544	.4948
.5361	.0535	.0528	.0563	.0585	.0596	.0609	.0590	.0567	.0569	.0556	.5361
.5773	.0547	.0540	.0587	.0609	.0631	.0609	.0590	.0590	.0581	.0580	.5773
.6186	.0559	.0575	.0598	.0632	.0655	.0609	.0602	.0602	.0593	.0591	.6186
.6598	.0582	.0622	.0645	.0656	.0690	.0598	.0602	.0614	.0604	.0603	.6598
.7010	.0594	.0634	.0657	.0679	.0690	.0621	.0626	.0637	.0628	.0615	.7010
.7423	.0629	.0657	.0692	.0691	.0713	.0609	.0614	.0637	.0616	.0615	.7423
.7835	.0629	.0657	.0681	.0679	.0701	.0633	.0637	.0661	.0640	.0627	.7835
.8247	.0629	.0657	.0669	.0691	.0713	.0644	.0649	.0661	.0651	.0638	.8247
.8660	.0676	.0681	.0692	.0726	.0737	.0656	.0661	.0661	.0663	.0662	.8660
.9072	.0699	.0716	.0739	.0761	.0760	.0668	.0661	.0673	.0687	.0674	.9072
.9485	.0699	.0704	.0739	.0726	.0725	.0691	.0684	.0696	.0698	.0674	.9485
.9897	.0711	.0728	.0763	.0714	.0713	.0715	.0708	.0708	.0698	.0674	.9897
1.0309	.0735	.0751	.0763	.0726	.0725	.0738	.0731	.0731	.0710	.0697	1.0309

(b) $\alpha = 4°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6761	1.6743	1.6729	1.6768	1.6796	1.6761	1.6743	1.6729	1.6768	1.6796	.0000
.0206	1.5683	1.5758	1.5791	1.6017	1.6185	1.6714	1.6673	1.6589	1.6440	1.6303	.0206
.0412	1.3994	1.4069	1.4219	1.4493	1.4800	1.5589	1.5500	1.5275	1.4985	1.4753	.0412
.0619	1.1087	1.1255	1.1426	1.1795	1.2192	1.3291	1.3178	1.2904	1.2546	1.2145	.0619
.0825	.7945	.8065	.8235	.8629	.9091	1.0618	.9355	1.0229	.9778	.9326	.0825
.1031	.5506	.5626	.5841	.6166	.6602	.7828	.7713	.7320	.6893	.6414	.1031
.1237	.2786	.2882	.3049	.3398	.3783	.4662	.4570	.4292	.3914	.3501	.1237
.1443	.1004	.1052	.1218	.1475	.1763	.2692	.2600	.2368	.2085	.1739	.1443
.1649	-.0309	-.0238	-.0166	.0020	.0236	.0934	.0865	.0702	.0466	.0236	.1649
.1856	-.0450	-.0402	-.0307	-.0120	.0095	.0793	.0724	.0538	.0349	.0095	.1856
.2062	-.0356	-.0308	-.0213	-.0027	.0189	.0910	.0865	.0679	.0489	.0259	.2062
.2474	-.0190	-.0130	-.0027	.0141	.0353	.1034	.0958	.0790	.0571	.0345	.2474
.2887	-.0096	-.0060	.0044	.0211	.0412	.1081	.1016	.0849	.0641	.0416	.2887
.3299	-.0026	-.0001	.0102	.0246	.0447	.1093	.1040	.0873	.0665	.0474	.3299
.3711	.0009	.0046	.0114	.0258	.0459	.1093	.1028	.0884	.0676	.0486	.3711
.4124	.0056	.0081	.0161	.0293	.0483	.1128	.1052	.0884	.0700	.0498	.4124
.4536	.0091	.0104	.0184	.0328	.0506	.1128	.1052	.0884	.0700	.0510	.4536
.4948	.0115	.0128	.0208	.0340	.0518	.1128	.1052	.0884	.0712	.0521	.4948
.5361	.0150	.0151	.0231	.0352	.0541	.1116	.1052	.0884	.0712	.0521	.5361
.5773	.0173	.0187	.0243	.0375	.0565	.1128	.1052	.0908	.0723	.0533	.5773
.6186	.0197	.0222	.0278	.0387	.0577	.1128	.1052	.0920	.0735	.0545	.6186
.6598	.0244	.0245	.0302	.0399	.0588	.1116	.1052	.0920	.0735	.0545	.6598
.7010	.0267	.0280	.0325	.0411	.0588	.1128	.1075	.0931	.0759	.0568	.7010
.7423	.0302	.0327	.0337	.0422	.0600	.1116	.1052	.0943	.0747	.0568	.7423
.7835	.0302	.0327	.0349	.0446	.0600	.1151	.1075	.0967	.0759	.0580	.7835
.8247	.0314	.0327	.0372	.0469	.0624	.1151	.1087	.0955	.0771	.0592	.8247
.8660	.0338	.0351	.0419	.0516	.0659	.1163	.1099	.0955	.0771	.0604	.8660
.9072	.0361	.0386	.0454	.0516	.0659	.1175	.1087	.0967	.0794	.0615	.9072
.9485	.0349	.0386	.0442	.0481	.0624	.1187	.1099	.0967	.0806	.0615	.9485
.9897	.0385	.0410	.0431	.0481	.0624	.1222	.1122	.1002	.0806	.0639	.9897
1.0309	.0420	.0445	.0442	.0516	.0647	.1234	.1157	.1014	.0818	.0639	1.0309

TABLE III.- SURFACE-PRESSURE COEFFICIENTS AT M_∞ = 2.30 - Concluded

(c) α = 8°

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6498	1.6547	1.6513	1.6553	1.6535	1.6498	1.6547	1.6513	1.6553	1.6535	.0000
.0206	1.4998	1.5090	1.5247	1.5590	1.5948	1.6826	1.6806	1.6631	1.6389	1.6089	.0206
.0412	1.3029	1.3187	1.3464	1.3994	1.4539	1.6147	1.6030	1.5669	1.5168	1.4515	.0412
.0619	.9935	1.0155	1.0531	1.1200	1.2026	1.4224	1.4056	1.3510	1.2843	1.2002	.0619
.0825	.6817	.6982	.7364	.8053	.8949	1.1716	1.1518	1.0906	1.0119	.9184	.0825
.1031	.4379	.4515	.4924	.5611	.6483	.8950	.8698	.8115	.7255	.6295	.1031
.1237	.1941	.2094	.2414	.2982	.3688	.5785	.5525	.5041	.4249	.3500	.1237
.1443	.0370	.0472	.0701	.1150	.1715	.3652	.3457	.3024	.2395	.1762	.1443
.1649	-.0778	-.0703	-.0495	-.0188	.0212	.1636	.1530	.1170	.0751	.0259	.1649
.1856	-.0896	-.0844	-.0659	-.0329	.0071	.1496	.1389	.1053	.0587	.0118	.1856
.2062	-.0825	-.0491	-.0589	-.0259	.0165	.1613	.1459	.1170	.0751	.0282	.2062
.2474	-.0625	-.0565	-.0390	-.0072	.0341	.1754	.1622	.1279	.0824	.0356	.2474
.2887	-.0519	-.0471	-.0320	-.0025	.0364	.1789	.1658	.1326	.0883	.0403	.2887
.3299	-.0425	-.0389	-.0261	.0010	.0400	.1789	.1658	.1338	.0883	.0427	.3299
.3711	-.0332	-.0319	-.0226	.0022	.0400	.1766	.1646	.1303	.0871	.0427	.3711
.4124	-.0273	-.0260	-.0168	.0045	.0423	.1778	.1646	.1291	.0871	.0427	.4124
.4536	-.0238	-.0225	-.0144	.0069	.0411	.1789	.1634	.1303	.0859	.0415	.4536
.4948	-.0191	-.0178	-.0121	.0069	.0411	.1766	.1611	.1291	.0859	.0415	.4948
.5361	-.0144	-.0143	-.0121	.0057	.0400	.1778	.1611	.1291	.0836	.0403	.5361
.5773	-.0097	-.0119	-.0109	.0057	.0400	.1754	.1622	.1291	.0836	.0391	.5773
.6186	-.0062	-.0084	-.0085	.0069	.0400	.1754	.1634	.1291	.0847	.0391	.6186
.6598	-.0003	-.0013	-.0015	.0104	.0423	.1754	.1611	.1291	.0836	.0380	.6598
.7010	.0032	.0045	-.0003	.0104	.0447	.1778	.1622	.1303	.0836	.0415	.7010
.7423	.0102	.0069	.0044	.0139	.0470	.1766	.1622	.1279	.0836	.0391	.7423
.7835	.0126	.0069	.0044	.0128	.0447	.1789	.1634	.1291	.0859	.0403	.7835
.8247	.0138	.0080	.0044	.0104	.0400	.1789	.1646	.1303	.0871	.0403	.8247
.8660	.0161	.0116	.0032	.0092	.0388	.1801	.1646	.1303	.0871	.0391	.8660
.9072	.0184	.0139	.0044	.0104	.0388	.1789	.1646	.1303	.0859	.0380	.9072
.9485	.0184	.0139	.0044	.0092	.0364	.1801	.1669	.1315	.0836	.0380	.9485
.9897	.0196	.0139	.0044	.0092	.0364	.1848	.1693	.1326	.0836	.0391	.9897
1.0309	.0231	.0163	.0090	.0128	.0388	.1872	.1728	.1350	.0871	.0403	1.0309

(d) α = 12°

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6039	1.6054	1.6053	1.6088	1.6067	1.6039	1.6054	1.6053	1.6088	1.6067	.0000
.0206	1.4142	1.4268	1.4527	1.4962	1.5457	1.6765	1.6736	1.6475	1.6111	1.5621	.0206
.0412	1.1963	1.2223	1.2556	1.3320	1.4120	1.6531	1.6360	1.5818	1.5056	1.4143	.0412
.0619	.8661	.8933	.9504	1.0482	1.1657	1.5055	1.4809	1.4011	1.2921	1.1657	.0619
.0825	.5756	.5901	.6383	.7409	.8654	1.2783	1.2482	1.1617	1.0318	.8912	.0825
.1031	.3296	.3481	.4036	.5040	.6261	1.0043	.9756	.8871	.7573	.6097	.1031
.1237	.1141	.1318	.1759	.2530	.3563	.6997	.6630	.5773	.4641	.3446	.1237
.1443	-.0217	-.0115	.0233	.0841	.1616	.4678	.4444	.3707	.2718	.1710	.1443
.1649	-.1201	-.1126	-.0893	-.0402	.0185	.2476	.2282	.1712	.1006	.0255	.1649
.1856	-.1272	-.1196	-.0964	-.0543	.0044	.2312	.2141	.1618	.0865	.0115	.1856
.2062	-.1201	-.1126	-.0893	-.0472	.0138	.2476	.2235	.1689	.1006	.0279	.2062
.2474	-.0964	-.0915	-.0716	-.0283	.0337	.2620	.2374	.1814	.1075	.0341	.2474
.2887	-.0777	-.0774	-.0633	-.0236	.0349	.2608	.2386	.1826	.1111	.0376	.2887
.3299	-.0683	-.0680	-.0575	-.0212	.0337	.2608	.2374	.1826	.1087	.0376	.3299
.3711	-.0636	-.0621	-.0551	-.0236	.0314	.2561	.2339	.1791	.1052	.0352	.3711
.4124	-.0589	-.0551	-.0516	-.0236	.0314	.2584	.2339	.1767	.1040	.0329	.4124
.4536	-.0542	-.0492	-.0516	-.0271	.0267	.2573	.2315	.1744	.1005	.0294	.4536
.4948	-.0436	-.0468	-.0516	-.0294	.0232	.2573	.2303	.1732	.0993	.0270	.4948
.5361	-.0343	-.0421	-.0528	-.0318	.0220	.2573	.2303	.1732	.0981	.0235	.5361
.5773	-.0225	-.0374	-.0493	-.0306	.0220	.2584	.2327	.1744	.0981	.0235	.5773
.6186	-.0131	-.0304	-.0469	-.0318	.0220	.2561	.2327	.1732	.0946	.0212	.6186
.6598	-.0073	-.0233	-.0457	-.0330	.0220	.2549	.2303	.1709	.0934	.0188	.6598
.7010	-.0038	-.0186	-.0457	-.0377	.0161	.2584	.2315	.1720	.0958	.0176	.7010
.7423	-.0002	-.0139	-.0457	-.0388	.0138	.2573	.2303	.1697	.0923	.0129	.7423
.7835	-.0002	-.0139	-.0481	-.0424	.0103	.2573	.2315	.1720	.0923	.0118	.7835
.8247	-.0002	-.0139	-.0481	-.0435	.0079	.2573	.2327	.1744	.0887	.0106	.8247
.8660	.0009	-.0116	-.0457	-.0447	.0079	.2608	.2327	.1709	.0887	.0094	.8660
.9072	.0009	-.0104	-.0422	-.0435	.0068	.2608	.2362	.1720	.0887	.0094	.9072
.9485	.0009	-.0104	-.0410	-.0470	.0044	.2643	.2351	.1720	.0887	.0082	.9485
.9897	.0009	-.0092	-.0387	-.0470	.0044	.2690	.2362	.1767	.0911	.0106	.9897
1.0309	.0045	-.0057	-.0352	-.0424	.0068	.2702	.2351	.1767	.0923	.0118	1.0309

TABLE IV.- SURFACE-PRESSURE COEFFICIENTS AT M_∞ = 2.96

(a) α = 0°

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.7341	1.7340	1.7344	1.7348	1.7375	1.7341	1.7340	1.7344	1.7348	1.7375	.0000
.0206	1.6704	1.6703	1.6762	1.6767	1.6765	1.6843	1.6842	1.6873	1.6877	1.6848	.0206
.0412	1.5209	1.5208	1.5267	1.5243	1.5269	1.5264	1.5208	1.5239	1.5215	1.5186	.0412
.0619	1.2494	1.2494	1.2497	1.2528	1.2526	1.2494	1.2494	1.2497	1.2472	1.2471	.0619
.0825	.9337	.9309	.9339	.9397	.9396	.9586	.9613	.9588	.9591	.9590	.0825
.1031	.6761	.6733	.6763	.6792	.6819	.6651	.6650	.6652	.6681	.6625	.1031
.1237	.3936	.3936	.3965	.4022	.4049	.3826	.3825	.3854	.3828	.3827	.1237
.1443	.2081	.2081	.2081	.2110	.2137	.2081	.2081	.2109	.2110	.2110	.1443
.1649	.0724	.0696	.0724	.0725	.0724	.0751	.0724	.0752	.0725	.0724	.1649
.1856	.0502	.0474	.0502	.0531	.0530	.0530	.0502	.0558	.0531	.0558	.1856
.2062	.0502	.0502	.0530	.0531	.0558						.2062
.2474	.0583	.0569	.0582	.0583	.0584	.0590	.0590	.0587	.0574	.0562	.2474
.2887	.0569	.0569	.0568	.0569	.0571	.0576	.0576	.0573	.0574	.0548	.2887
.3299	.0555	.0541	.0554	.0555	.0557	.0563	.0562	.0559	.0560	.0548	.3299
.3711	.0528	.0527	.0527	.0527	.0543	.0549	.0548	.0545	.0546	.0520	.3711
.4124	.0528	.0527	.0527	.0527	.0543	.0535	.0534	.0531	.0532	.0520	.4124
.4536	.0528	.0513	.0527	.0527	.0529	.0535	.0534	.0531	.0532	.0520	.4536
.4948	.0528	.0513	.0527	.0513	.0515	.0521	.0521	.0518	.0518	.0506	.4948
.5361	.0528	.0513	.0527	.0513	.0515	.0521	.0521	.0518	.0518	.0506	.5361
.5773	.0528	.0527	.0527	.0527	.0515	.0521	.0521	.0518	.0518	.0506	.5773
.6186	.0528	.0527	.0527	.0527	.0515	.0521	.0521	.0518	.0518	.0506	.6186
.6598	.0528	.0527	.0541	.0527	.0529	.0521	.0521	.0518	.0518	.0506	.6598
.7010	.0541	.0527	.0541	.0541	.0543	.0535	.0521	.0531	.0518	.0506	.7010
.7423	.0555	.0541	.0554	.0555	.0543	.0535	.0534	.0531	.0518	.0506	.7423
.7835	.0555	.0541	.0554	.0555	.0557	.0549	.0534	.0531	.0532	.0520	.7835
.8247	.0555	.0541	.0554	.0555	.0557	.0549	.0548	.0545	.0546	.0520	.8247
.8660	.0569	.0555	.0554	.0569	.0557	.0549	.0548	.0559	.0546	.0534	.8660
.9072	.0569	.0555	.0568	.0569	.0571	.0549	.0562	.0559	.0560	.0548	.9072
.9485	.0569	.0569	.0568	.0569	.0571	.0563	.0562	.0573	.0560	.0548	.9485
.9897	.0569	.0569	.0568	.0569	.0571	.0563	.0562	.0573	.0574	.0562	.9897
1.0309	.0638	.0638	.0637	.0638	.0640	.0604	.0604	.0615	.0615	.0603	1.0309

(b) α = 4°

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.7208	1.7200	1.7206	1.7236	1.7227	1.7208	1.7200	1.7206	1.7236	1.7227	.0000
.0206	1.6183	1.6175	1.6292	1.6461	1.6618	1.7180	1.7117	1.7067	1.6959	1.6784	.0206
.0412	1.4410	1.4431	1.4602	1.4882	1.5150	1.5989	1.5926	1.5738	1.5436	1.5122	.0412
.0619	1.1362	1.1468	1.1666	1.2083	1.2492	1.3606	1.3517	1.3245	1.2887	1.2436	.0619
.0825	.8232	.8255	.8508	.8870	.9307	1.0836	1.0720	1.0419	1.0033	.9501	.0825
.1031	.5572	.5680	.5959	.6293	.6704	.7927	.7729	.7455	.7069	.6594	.1031
.1237	.3051	.3132	.3356	.3633	.3963	.4852	.4711	.4491	.4215	.3825	.1237
.1443	.1417	.1443	.1610	.1860	.2080	.2913	.2800	.2635	.2414	.2108	.1443
.1649	.0226	.0225	.0336	.0530	.0723	.1306	.1249	.1140	.0946	.0723	.1649
.1856	.0004	.0086	.0170	.0309	.0474	.1084	.1028	.0973	.0752	.0529	.1856
.2062	.0032	.0114	.0198	.0337	.0502						.2062
.2474	.0157	.0182	.0266	.0403	.0581	.1129	.1071	.0936	.0767	.0586	.2474
.2887	.0157	.0196	.0266	.0389	.0567	.1088	.1057	.0922	.0754	.0572	.2887
.3299	.0170	.0196	.0252	.0375	.0553	.1074	.1029	.0894	.0726	.0558	.3299
.3711	.0170	.0196	.0252	.0361	.0526	.1032	.0987	.0867	.0712	.0530	.3711
.4124	.0184	.0196	.0252	.0361	.0512	.1018	.0974	.0853	.0698	.0530	.4124
.4536	.0184	.0196	.0252	.0347	.0498	.1004	.0960	.0825	.0670	.0517	.4536
.4948	.0184	.0196	.0252	.0347	.0498	.0991	.0946	.0825	.0670	.0503	.4948
.5361	.0184	.0210	.0252	.0347	.0498	.0991	.0946	.0825	.0657	.0489	.5361
.5773	.0184	.0210	.0252	.0347	.0498	.1004	.0946	.0811	.0657	.0489	.5773
.6186	.0198	.0210	.0252	.0347	.0498	.1004	.0946	.0825	.0657	.0489	.6186
.6598	.0212	.0224	.0252	.0347	.0498	.1004	.0960	.0811	.0657	.0489	.6598
.7010	.0212	.0224	.0266	.0347	.0498	.1018	.0974	.0825	.0657	.0489	.7010
.7423	.0212	.0224	.0266	.0361	.0512	.1018	.0974	.0825	.0657	.0489	.7423
.7835	.0226	.0224	.0266	.0361	.0512	.1032	.0974	.0839	.0657	.0503	.7835
.8247	.0226	.0224	.0266	.0361	.0512	.1046	.0987	.0853	.0670	.0503	.8247
.8660	.0226	.0237	.0266	.0361	.0512	.1032	.0987	.0853	.0670	.0503	.8660
.9072	.0240	.0237	.0280	.0361	.0526	.1046	.1001	.0867	.0684	.0517	.9072
.9485	.0226	.0251	.0280	.0375	.0526	.1046	.1001	.0867	.0698	.0517	.9485
.9897	.0226	.0251	.0280	.0375	.0526	.1060	.1029	.0880	.0712	.0530	.9897
1.0309	.0295	.0334	.0377	.0458	.0595	.1088	.1071	.0908	.0754	.0572	1.0309

TABLE IV.- SURFACE-PRESSURE COEFFICIENTS AT $M_\infty = 2.96$ - Concluded

(c) $\alpha = 8°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6994	1.6926	1.6949	1.6935	1.6957	1.6994	1.6926	1.6949	1.6935	1.6957	.0000
.0206	1.5192	1.5458	1.5675	1.5965	1.6347	1.7382	1.7258	1.7115	1.6879	1.6541	.0206
.0412	1.3474	1.3491	1.3793	1.4330	1.4907	1.6606	1.6483	1.6091	1.5549	1.4935	.0412
.0619	1.0176	1.0306	1.0747	1.1504	1.2275	1.4610	1.4405	1.3876	1.3166	1.2303	.0619
.0825	.7155	.7149	.7590	.8289	.9145	1.1950	1.1774	1.1217	1.0368	.9422	.0825
.1031	.4605	.4656	.5098	.5768	.6597	.9095	.8839	.8255	.6017	.6514	.1031
.1237	.2277	.2385	.2689	.3219	.3910	.5880	.5681	.5181	.4493	.3799	.1237
.1443	.0892	.0945	.1138	.1556	.2026	.3802	.3576	.3215	.2664	.2081	.1443
.1649	-.0106	-.0080	.0031	.0309	.0696	.1972	.1859	.1554	.1140	.0724	.1649
.1856	-.0272	-.0273	-.0108	.0171	.0475	.1723	.1610	.1332	.1002	.0530	.1856
.2062	-.0245	-.0246	-.0080	.0171	.0502						.2062
.2474	-.0177	-.0136	.0003	.0251	.0557	.1741	.1649	.1362	.0976	.0587	.2474
.2887	-.0149	-.0108	.0003	.0223	.0529	.1699	.1608	.1321	.0948	.0573	.2887
.3299	-.0122	-.0080	.0003	.0209	.0501	.1657	.1566	.1279	.0920	.0545	.3299
.3711	-.0108	-.0067	.0003	.0181	.0460	.1616	.1525	.1251	.0892	.0504	.3711
.4124	-.0080	-.0053	.0003	.0181	.0446	.1616	.1511	.1224	.0865	.0490	.4124
.4536	-.0066	-.0053	.0003	.0168	.0432	.1602	.1511	.1224	.0837	.0462	.4536
.4948	-.0053	-.0039	-.0011	.0154	.0418	.1602	.1497	.1210	.0823	.0448	.4948
.5361	-.0039	-.0039	-.0011	.0140	.0390	.1602	.1497	.1196	.0809	.0420	.5361
.5773	-.0025	-.0025	-.0025	.0126	.0390	.1616	.1511	.1196	.0809	.0420	.5773
.6186	-.0025	-.0025	-.0025	.0126	.0377	.1630	.1511	.1196	.0795	.0407	.6186
.6598	-.0011	-.0025	-.0025	.0126	.0377	.1630	.1511	.1196	.0782	.0393	.6598
.7010	-.0025	-.0025	-.0025	.0112	.0377	.1643	.1539	.1210	.0795	.0393	.7010
.7423	-.0025	-.0025	-.0025	.0112	.0377	.1643	.1539	.1210	.0795	.0393	.7423
.7835	-.0025	-.0025	-.0025	.0112	.0377	.1643	.1553	.1224	.0795	.0393	.7835
.8247	-.0011	-.0011	-.0011	.0112	.0377	.1657	.1553	.1224	.0809	.0393	.8247
.8660	.0003	.0016	.0003	.0126	.0390	.1671	.1566	.1224	.0809	.0407	.8660
.9072	.0017	.0044	.0016	.0126	.0390	.1671	.1580	.1238	.0809	.0407	.9072
.9485	.0044	.0058	.0016	.0112	.0390	.1685	.1580	.1238	.0809	.0420	.9485
.9897	.0072	.0058	.0030	.0126	.0390	.1699	.1594	.1265	.0837	.0434	.9897
1.0309	.0155	.0155	.0113	.0209	.0460	.1727	.1622	.1293	.0879	.0476	1.0309

(d) $\alpha = 12°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6540	1.6512	1.6563	1.6562	1.6568	1.6540	1.6512	1.6563	1.6562	1.6568	.0000
.0206	1.4601	1.4628	1.4957	1.5399	1.5903	1.7343	1.7204	1.6978	1.6618	1.6097	.0206
.0412	1.2357	1.2496	1.2963	1.3627	1.4518	1.7066	1.6844	1.6314	1.5510	1.4574	.0412
.0619	.8895	.9089	.9723	1.0720	1.1914	1.5459	1.5155	1.4403	1.3295	1.1998	.0619
.0825	.6042	.6125	.6649	.7590	.8868	1.3105	1.2773	1.1855	1.0581	.9145	.0825
.1031	.3632	.3771	.4295	.5181	.6402	1.0224	.9920	.9031	.7701	.6347	.1031
.1237	.1610	.1693	.2108	.2828	.3826	.6984	.6679	.5929	.4849	.3715	.1237
.1443	.0336	.0447	.0751	.1277	.1970	.4740	.4491	.3852	.2938	.2054	.1443
.1649	-.0523	-.0412	-.0246	.0169	.0669	.2718	.2524	.2025	.1360	.0696	.1649
.1856	-.0606	-.0578	-.0357	-.0024	.0475	.2441	.2247	.1831	.1194	.0502	.1856
.2062	-.0606	-.0523	-.0329	.0003	.0502						.2062
.2474	-.0439	-.0400	-.0246	.0072	.0556	.2464	.2305	.1833	.1209	.0587	.2474
.2887	-.0384	-.0359	-.0233	.0058	.0515	.2409	.2249	.1778	.1154	.0559	.2887
.3299	-.0329	-.0331	-.0246	.0030	.0473	.2381	.2208	.1736	.1112	.0517	.3299
.3711	-.0287	-.0303	-.0260	-.0011	.0418	.2339	.2180	.1695	.1057	.0462	.3711
.4124	-.0259	-.0262	-.0260	-.0025	.0390	.2353	.2180	.1681	.1043	.0448	.4124
.4536	-.0232	-.0262	-.0274	-.0067	.0349	.2353	.2180	.1667	.1015	.0406	.4536
.4948	-.0218	-.0248	-.0288	-.0081	.0321	.2353	.2180	.1653	.0988	.0379	.4948
.5361	-.0204	-.0248	-.0302	-.0122	.0321	.2381	.2180	.1639	.0974	.0351	.5361
.5773	-.0190	-.0248	-.0316	-.0150	.0280	.2395	.2194	.1667	.0960	.0323	.5773
.6186	-.0190	-.0248	-.0330	-.0164	.0280	.2409	.2208	.1667	.0960	.0323	.6186
.6598	-.0190	-.0248	-.0343	-.0178	.0266	.2409	.2208	.1667	.0946	.0309	.6598
.7010	-.0162	-.0234	-.0343	-.0205	.0266	.2436	.2221	.1681	.0960	.0309	.7010
.7423	-.0135	-.0206	-.0330	-.0205	.0266	.2436	.2249	.1681	.0946	.0296	.7423
.7835	-.0107	-.0193	-.0343	-.0205	.0238	.2450	.2263	.1695	.0960	.0296	.7835
.8247	-.0079	-.0165	-.0343	-.0233	.0224	.2464	.2277	.1695	.0974	.0282	.8247
.8660	-.0052	-.0151	-.0343	-.0233	.0224	.2464	.2277	.1695	.0974	.0282	.8660
.9072	-.0038	-.0137	-.0343	-.0247	.0210	.2492	.2291	.1709	.0974	.0268	.9072
.9485	-.0024	-.0124	-.0343	-.0261	.0210	.2520	.2305	.1709	.0974	.0268	.9485
.9897	-.0024	-.0124	-.0343	-.0261	.0210	.2561	.2332	.1736	.1002	.0282	.9897
1.0309	.0059	-.0027	-.0246	-.0178	.0280	.2603	.2374	.1778	.1043	.0323	1.0309

TABLE V.- SURFACE-PRESSURE COEFFICIENTS AT $M_\infty = 3.95$

(a) $\alpha = 0°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.7566	1.7545	1.7508	1.7544	1.7544	1.7566	1.7545	1.7508	1.7544	1.7544	.0000
.0206	1.6884	1.6900	1.6863	1.6899	1.6934	1.7171	1.7151	1.7078	1.7078	1.7078	.0206
.0412	1.5341	1.5394	1.5321	1.5357	1.5393	1.5484	1.5466	1.5393	1.5357	1.5357	.0412
.0619	1.2506	1.2491	1.2490	1.2526	1.2597	1.2613	1.2634	1.2597	1.2562	1.2526	.0619
.0825	.9276	.9300	.9264	.9300	.9407	.9671	.9659	.9587	.9551	.9515	.0825
.1031	.6585	.6576	.6612	.6647	.6683	.6620	.6648	.6647	.6612	.6576	.1031
.1237	.3893	.3924	.3923	.3959	.4031	.3965	.3959	.3887	.3887	.3852	.1237
.1443	.2171	.2167	.2131	.2203	.2239	.2242	.2239	.2239	.2239	.2203	.1443
.1649	.0879	.0877	.0912	.0948	.0948	.1022	.1056	.0984	.0984	.0948	.1649
.1856	.0699	.0697	.0662	.0697	.0733	.0771	.0769	.0769	.0769	.0733	.1856
.2062	.0663	.0697	.0662	.0662	.0697						.2062
.2474	.0680	.0682	.0664	.0700	.0718	.0718	.0700	.0718	.0684	.0682	.2474
.2887	.0609	.0628	.0628	.0646	.0664	.0664	.0646	.0664	.0630	.0628	.2887
.3299	.0573	.0575	.0574	.0592	.0556	.0610	.0593	.0610	.0576	.0574	.3299
.3711	.0537	.0539	.0538	.0556	.0574	.0556	.0539	.0556	.0522	.0538	.3711
.4124	.0501	.0503	.0503	.0520	.0538	.0521	.0503	.0521	.0486	.0502	.4124
.4536	.0483	.0485	.0485	.0502	.0502	.0485	.0485	.0485	.0450	.0466	.4536
.4948	.0447	.0467	.0449	.0484	.0484	.0467	.0449	.0467	.0432	.0431	.4948
.5361	.0429	.0431	.0431	.0466	.0466	.0449	.0431	.0449	.0414	.0413	.5361
.5773	.0429	.0431	.0413	.0449	.0466	.0431	.0413	.0431	.0396	.0395	.5773
.6186	.0411	.0413	.0413	.0431	.0431	.0413	.0395	.0413	.0396	.0395	.6186
.6598	.0411	.0323	.0395	.0431	.0431	.0413	.0395	.0413	.0378	.0395	.6598
.7010	.0393	.0413	.0413	.0413	.0431	.0413	.0377	.0395	.0378	.0395	.7010
.7423	.0393	.0395	.0395	.0395	.0431	.0395	.0377	.0395	.0378	.0395	.7423
.7835	.0393	.0395	.0395	.0431	.0431	.0395	.0377	.0395	.0378	.0377	.7835
.8247	.0393	.0395	.0395	.0413	.0431	.0395	.0377	.0395	.0378	.0395	.8247
.8660	.0393	.0395	.0413	.0413	.0431	.0395	.0377	.0395	.0378	.0395	.8660
.9072	.0411	.0413	.0413	.0413	.0395	.0395	.0377	.0395	.0378	.0395	.9072
.9485	.0411	.0413	.0413	.0431	.0431	.0413	.0395	.0413	.0378	.0395	.9485
.9897	.0411	.0431	.0413	.0431	.0431	.0395	.0395	.0413	.0396	.0395	.9897
1.0309	.0573	.0575	.0538	.0574	.0574	.0485	.0467	.0485	.0468	.0484	1.0309

(b) $\alpha = 4°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.7458	1.7473	1.7436	1.7472	1.7437	1.7458	1.7473	1.7436	1.7472	1.7437	.0000
.0206	1.6310	1.6290	1.6433	1.6648	1.6792	1.7458	1.7366	1.7329	1.7149	1.7007	.0206
.0412	1.4443	1.4498	1.4676	1.4999	1.5287	1.6238	1.6183	1.5967	1.5680	1.5287	.0412
.0619	1.1250	1.1344	1.1630	1.2024	1.2491	1.3762	1.3638	1.3422	1.2992	1.2491	.0619
.0825	.8056	.8153	.8404	.8798	.9265	1.0891	1.0770	1.0483	1.0017	.9480	.0825
.1031	.5436	.5537	.5787	.6181	.6612	.7876	.7723	.7436	.7042	.6540	.1031
.1237	.3032	.3171	.3350	.2920	.3959	.4826	.4784	.4568	.4246	.3852	.1237
.1443	.1525	.1594	.1737	.1952	.2203	.2960	.2920	.2740	.2490	.2167	.1443
.1649	.0484	.0518	.0626	.0877	.0948	.1489	.1486	.1343	.1163	.0948	.1649
.1856	.0340	.0375	.0446	.0554	.0697	.1238	.1235	.1092	.0948	.0733	.1856
.2062	.0305	.0339	.0411	.0518	.0662						.2062
.2474	.0358	.0376	.0449	.0556	.0718	.1183	.1115	.1023	.0862	.0700	.2474
.2887	.0322	.0340	.0395	.0485	.0646	.1093	.1026	.0951	.0790	.0628	.2887
.3299	.0304	.0304	.0359	.0467	.0592	.1039	.0954	.0880	.0736	.0574	.3299
.3711	.0268	.0286	.0323	.0413	.0538	.0967	.0900	.0826	.0682	.0520	.3711
.4124	.0250	.0250	.0305	.0377	.0520	.0932	.0864	.0772	.0646	.0502	.4124
.4536	.0214	.0232	.0269	.0359	.0395	.0896	.0828	.0754	.0610	.0466	.4536
.4948	.0214	.0214	.0251	.0341	.0466	.0860	.0792	.0718	.0574	.0431	.4948
.5361	.0196	.0214	.0233	.0305	.0431	.0842	.0774	.0700	.0556	.0413	.5361
.5773	.0178	.0196	.0233	.0305	.0431	.0842	.0774	.0682	.0538	.0395	.5773
.6186	.0178	.0196	.0215	.0287	.0413	.0842	.0756	.0682	.0538	.0395	.6186
.6598	.0178	.0160	.0197	.0287	.0413	.0824	.0756	.0664	.0521	.0377	.6598
.7010	.0160	.0178	.0197	.0287	.0395	.0824	.0756	.0664	.0521	.0377	.7010
.7423	.0160	.0178	.0197	.0287	.0359	.0824	.0756	.0664	.0521	.0377	.7423
.7835	.0160	.0178	.0197	.0269	.0395	.0824	.0756	.0664	.0521	.0377	.7835
.8247	.0160	.0178	.0197	.0269	.0395	.0842	.0756	.0682	.0521	.0377	.8247
.8660	.0160	.0178	.0197	.0269	.0395	.0842	.0756	.0682	.0521	.0377	.8660
.9072	.0160	.0178	.0197	.0269	.0395	.0842	.0774	.0682	.0538	.0377	.9072
.9485	.0160	.0178	.0197	.0269	.0395	.0860	.0774	.0682	.0538	.0377	.9485
.9897	.0160	.0178	.0197	.0269	.0395	.0860	.0792	.0700	.0538	.0377	.9897
1.0309	.0304	.0322	.0341	.0431	.0556	.0932	.0864	.0772	.0628	.0466	1.0309

TABLE V.- SURFACE-PRESSURE COEFFICIENTS AT $M_\infty = 3.95$ - Concluded

(c) $\alpha = 8°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.7151	1.7149	1.7149	1.7129	1.7063	1.7151	1.7149	1.7149	1.7129	1.7063	.0000
.0206	1.5502	1.5572	1.5752	1.6091	1.6417	1.7545	1.7508	1.7329	1.7022	1.6632	.0206
.0412	1.3423	1.3565	1.3852	1.4373	1.4946	1.6828	1.6683	1.6325	1.5697	1.4946	.0412
.0619	1.0017	1.0196	1.0662	1.1401	1.2219	1.4785	1.4605	1.4031	1.3227	1.2254	.0619
.0825	.6970	.7149	.7472	.8179	.9061	1.2096	1.1845	1.1271	1.0363	.9240	.0825
.1031	.4497	.4640	.4963	.5636	.6441	.9050	.8870	.8224	.7355	.6369	.1031
.1237	.2418	.2525	.2776	.3273	.3821	.5895	.5715	.5249	.4527	.3714	.1237
.1443	.1056	.1127	.1307	.1698	.2063	.3744	.3672	.3278	.2736	.2063	.1443
.1649	.0160	.0231	.0339	.0624	.0879	.2095	.1988	.1737	.1376	.0879	.1649
.1856	.0052	.0052	.0196	.0409	.0627	.1845	.1737	.1486	.1125	.0699	.1856
.2062	.0016	.0052	.0196	.0373	.0592						.2062
.2474	.0090	.0126	.0233	.0431	.0682	.1685	.1580	.1349	.1041	.0716	.2474
.2887	.0090	.0108	.0197	.0377	.0628	.1595	.1490	.1259	.0951	.0644	.2887
.3299	.0072	.0090	.0179	.0323	.0556	.1506	.1400	.1187	.0879	.0590	.3299
.3711	.0054	.0072	.0126	.0287	.0502	.1434	.1346	.1115	.0825	.0537	.3711
.4124	.0054	.0054	.0108	.0251	.0484	.1416	.1310	.1079	.0772	.0483	.4124
.4536	.0036	.0054	.0090	.0215	.0449	.1380	.1292	.1043	.0736	.0447	.4536
.4948	.0036	.0036	.0072	.0197	.0413	.1362	.1257	.1025	.0700	.0429	.4948
.5361	.0018	.0018	.0054	.0161	.0377	.1362	.1257	.1007	.0700	.0393	.5361
.5773	.0018	.0018	.0036	.0143	.0377	.1362	.1239	.0989	.0682	.0393	.5773
.6186	.0018	.0018	.0018	.0125	.0359	.1362	.1257	.1007	.0682	.0375	.6186
.6598	.0018	.0018	.0018	.0125	.0341	.1362	.1257	.0989	.0664	.0357	.6598
.7010	.0018	-.0000	.0018	.0107	.0341	.1380	.1257	.0989	.0664	.0357	.7010
.7423	.0018	-.0000	-.0000	.0107	.0323	.1398	.1274	.1007	.0664	.0357	.7423
.7835	.0018	-.0000	-.0000	.0090	.0323	.1416	.1292	.1025	.0682	.0357	.7835
.8247	.0000	-.0000	-.0000	.0090	.0323	.1434	.1310	.1043	.0682	.0339	.8247
.8660	.0000	-.0000	-.0000	.0090	.0305	.1434	.1310	.1043	.0682	.0339	.8660
.9072	.0000	-.0018	-.0000	.0090	.0323	.1452	.1328	.1061	.0682	.0339	.9072
.9485	.0000	-.0018	-.0000	.0090	.0305	.1470	.1346	.1079	.0700	.0339	.9485
.9897	.0000	-.0018	-.0018	.0090	.0323	.1488	.1364	.1079	.0700	.0339	.9897
1.0309	.0162	.0161	.0161	.0251	.0466	.1559	.1436	.1151	.0772	.0429	1.0309

(d) $\alpha = 12°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6649	1.6667	1.6683	1.6683	1.6632	1.6649	1.6667	1.6683	1.6683	1.6632	.0000
.0206	1.4677	1.4765	1.4999	1.5465	1.5987	1.7509	1.7385	1.7149	1.6719	1.6202	.0206
.0412	1.2455	1.2612	1.3027	1.3708	1.4551	1.7294	1.7026	1.6468	1.5644	1.4587	.0412
.0619	.8727	.8988	.9658	1.0698	1.1896	1.5573	1.5375	1.4533	1.3350	1.1967	.0619
.0825	.5895	.6082	.6612	.7508	.8774	1.3208	1.2864	1.1916	1.0590	.9061	.0825
.1031	.3565	.3749	.4246	.5106	.6262	1.0268	.9957	.8977	.7651	.6262	.1031
.1237	.1737	.1847	.2239	.2884	.3785	.6970	.6728	.5930	.4855	.3678	.1237
.1443	.0662	.0735	.0984	.1414	.2027	.4712	.4467	.3852	.3027	.2063	.1443
.1649	-.0055	-.0019	.0160	.0446	.0843	.2812	.2673	.2167	.1593	.0879	.1649
.1856	-.0199	-.0162	-.0020	.0267	.0627	.2526	.2314	.1880	.1343	.0699	.1856
.2062	-.0199	-.0162	-.0020	.0231	.0592						.2062
.2474	-.0108	-.0072	.0036	.0287	.0664	.2316	.2158	.1759	.1205	.0684	.2474
.2887	-.0090	-.0072	.0018	.0233	.0592	.2208	.2068	.1669	.1097	.0612	.2887
.3299	-.0090	-.0072	-.0000	.0197	.0538	.2119	.1978	.1580	.1025	.0540	.3299
.3711	-.0072	-.0090	-.0036	.0143	.0466	.2083	.1924	.1508	.0953	.0468	.3711
.4124	-.0072	-.0090	-.0054	.0107	.0449	.2065	.1906	.1490	.0917	.0432	.4124
.4536	-.0072	-.0090	-.0090	.0072	.0377	.2065	.1888	.1454	.0881	.0396	.4536
.4948	-.0072	-.0090	-.0108	.0036	.0377	.2065	.1888	.1454	.0863	.0360	.4948
.5361	-.0072	-.0108	-.0126	.0018	.0341	.2083	.1906	.1436	.0845	.0342	.5361
.5773	-.0072	-.0108	-.0144	-.0000	.0305	.2101	.1924	.1454	.0845	.0324	.5773
.6186	-.0090	-.0126	-.0162	-.0036	.0305	.2137	.1960	.1472	.0845	.0306	.6186
.6598	-.0090	-.0126	-.0162	-.0054	.0287	.2155	.1978	.1490	.0845	.0288	.6598
.7010	-.0090	-.0126	-.0180	-.0072	.0287	.2190	.1996	.1508	.0845	.0270	.7010
.7423	-.0090	-.0144	-.0198	-.0072	.0269	.2190	.2014	.1508	.0845	.0270	.7423
.7835	-.0090	-.0162	-.0215	-.0090	.0269	.2226	.2050	.1544	.0845	.0270	.7835
.8247	-.0090	-.0162	-.0215	-.0108	.0269	.2262	.2086	.1562	.0863	.0270	.8247
.8660	-.0090	-.0162	-.0215	-.0126	.0269	.2280	.2086	.1580	.0863	.0270	.8660
.9072	-.0072	-.0180	-.0233	-.0126	.0251	.2316	.2122	.1598	.0881	.0270	.9072
.9485	-.0072	-.0180	-.0233	-.0126	.0251	.2334	.2140	.1616	.0881	.0252	.9485
.9897	-.0072	-.0162	-.0251	-.0126	.0251	.2370	.2176	.1634	.0899	.0270	.9897
1.0309	.0126	.0054	-.0054	.0054	.0377	.2424	.2247	.1705	.0971	.0342	1.0309

TABLE VI.- SURFACE-PRESSURE COEFFICIENTS AT M_∞ = 4.63

(a) α = 0°

Orifice station, s/l	C_p at meridian angle, θ, deg = 90	67.5	45	22.5	0	270	247.5	225	202.5	180	Orifice station, s/l
.0000	1.7625	1.7604	1.7623	1.7604	1.7604	1.7625	1.7604	1.7623	1.7604	1.7604	.0000
.0206	1.6941	1.6875	1.6893	1.6920	1.6966	1.7215	1.7194	1.7167	1.7148	1.7148	.0206
.0412	1.5345	1.5326	1.5342	1.5371	1.5462	1.5527	1.5462	1.5479	1.5462	1.5417	.0412
.0619	1.2425	1.2410	1.2423	1.2546	1.2592	1.2699	1.2683	1.2606	1.2592	1.2546	.0619
.0825	.9186	.9175	.9231	.9312	.9403	.9597	.9630	.9550	.9539	.9494	.0825
.1031	.6495	.6532	.6540	.6623	.6715	.6723	.6715	.6631	.6623	.6532	.1031
.1237	.3941	.3935	.3894	.3981	.4026	.3986	.3981	.3940	.3935	.3890	.1237
.1443	.2162	.2204	.2161	.2250	.2295	.2299	.2250	.2253	.2250	.2250	.1443
.1649	.0930	.0974	.0930	.1065	.1065	.1067	.1110	.1067	.1065	.1065	.1649
.1856	.0748	.0746	.0747	.0792	.0837	.0885	.0883	.0839	.0837	.0837	.1856
.2062	.0702	.0700	.0702	.0746	.0792						.2062
.2474	.0723	.0748	.0748	.0770	.0770	.0750	.0771	.0749	.0725	.0725	.2474
.2887	.0654	.0657	.0657	.0679	.0702	.0681	.0702	.0658	.0656	.0656	.2887
.3299	.0609	.0611	.0611	.0634	.0656	.0613	.0634	.0612	.0588	.0588	.3299
.3711	.0540	.0566	.0543	.0565	.0588	.0567	.0566	.0544	.0542	.0542	.3711
.4124	.0518	.0520	.0520	.0542	.0542	.0522	.0543	.0498	.0497	.0497	.4124
.4536	.0495	.0497	.0474	.0520	.0520	.0476	.0497	.0453	.0451	.0451	.4536
.4948	.0449	.0451	.0451	.0474	.0474	.0453	.0474	.0430	.0428	.0428	.4948
.5361	.0427	.0429	.0429	.0451	.0451	.0407	.0429	.0407	.0406	.0406	.5361
.5773	.0427	.0429	.0429	.0451	.0451	.0407	.0406	.0384	.0383	.0383	.5773
.6186	.0404	.0406	.0406	.0428	.0428	.0384	.0406	.0361	.0360	.0383	.6186
.6598	.0404	.0383	.0406	.0428	.0428	.0362	.0383	.0361	.0360	.0360	.6598
.7010	.0404	.0383	.0383	.0406	.0428	.0362	.0360	.0338	.0337	.0360	.7010
.7423	.0381	.0360	.0383	.0406	.0428	.0339	.0360	.0338	.0337	.0360	.7423
.7835	.0381	.0360	.0360	.0406	.0406	.0339	.0360	.0338	.0337	.0360	.7835
.8247	.0381	.0360	.0360	.0406	.0406	.0339	.0360	.0338	.0337	.0337	.8247
.8660	.0358	.0360	.0360	.0406	.0406	.0339	.0360	.0338	.0337	.0337	.8660
.9072	.0358	.0360	.0360	.0406	.0406	.0339	.0360	.0338	.0337	.0337	.9072
.9485	.0358	.0360	.0360	.0406	.0406	.0339	.0360	.0338	.0337	.0360	.9485

(b) α = 4°

Orifice station, s/l	C_p at meridian angle, θ, deg = 90	67.5	45	22.5	0	270	247.5	225	202.5	180	Orifice station, s/l
.0000	1.7558	1.7466	1.7466	1.7470	1.7513	1.7558	1.7466	1.7466	1.7470	1.7513	.0000
.0206	1.6328	1.6281	1.6418	1.6604	1.6829	1.7558	1.7420	1.7329	1.7151	1.6966	.0206
.0412	1.4460	1.4459	1.4641	1.4918	1.5326	1.6328	1.6236	1.6008	1.5692	1.5326	.0412
.0619	1.1225	1.1224	1.1543	1.1910	1.2501	1.3868	1.3684	1.3457	1.3004	1.2455	.0619
.0825	.8081	.8081	.8354	.8675	.9266	1.0952	1.0814	1.0495	.9951	.9403	.0825
.1031	.5439	.5438	.5757	.6123	.6623	.7945	.7762	.7534	.7035	.6487	.1031
.1237	.3115	.3069	.3297	.3617	.4026	.4983	.4846	.4573	.4255	.3890	.1237
.1443	.1612	.1612	.1748	.1977	.2295	.3070	.2978	.2750	.2523	.2250	.1443
.1649	.0609	.0609	.0746	.0837	.1065	.1657	.1566	.1384	.1247	.1065	.1649
.1856	.0427	.0427	.0518	.0609	.0837	.1338	.1293	.1201	.0974	.0837	.1856
.2062	.0427	.0381	.0473	.0609	.0792						.2062
.2474	.0449	.0450	.0541	.0612	.0770	.1203	.1138	.1044	.0885	.0723	.2474
.2887	.0404	.0427	.0473	.0544	.0679	.1089	.1024	.0953	.0793	.0655	.2887
.3299	.0358	.0382	.0450	.0498	.0634	.1020	.0955	.0885	.0725	.0609	.3299
.3711	.0313	.0336	.0382	.0430	.0565	.0952	.0887	.0816	.0656	.0541	.3711
.4124	.0290	.0314	.0359	.0407	.0542	.0906	.0841	.0771	.0611	.0495	.4124
.4536	.0267	.0268	.0336	.0384	.0520	.0861	.0795	.0725	.0565	.0450	.4536
.4948	.0244	.0245	.0313	.0338	.0474	.0815	.0772	.0679	.0542	.0427	.4948
.5361	.0222	.0222	.0291	.0315	.0451	.0792	.0727	.0657	.0497	.0404	.5361
.5773	.0199	.0222	.0268	.0293	.0428	.0792	.0727	.0657	.0497	.0382	.5773
.6186	.0199	.0200	.0245	.0293	.0428	.0770	.0704	.0634	.0474	.0359	.6186
.6598	.0199	.0200	.0245	.0293	.0406	.0770	.0704	.0634	.0451	.0359	.6598
.7010	.0176	.0200	.0222	.0270	.0406	.0770	.0704	.0611	.0451	.0359	.7010
.7423	.0176	.0177	.0222	.0270	.0406	.0770	.0704	.0611	.0451	.0336	.7423
.7835	.0176	.0177	.0222	.0247	.0383	.0770	.0704	.0611	.0451	.0336	.7835
.8247	.0176	.0177	.0199	.0247	.0383	.0770	.0704	.0634	.0451	.0336	.8247
.8660	.0176	.0177	.0199	.0247	.0383	.0770	.0704	.0634	.0451	.0336	.8660
.9072	.0153	.0154	.0199	.0224	.0383	.0770	.0704	.0634	.0451	.0336	.9072
.9485	.0153	.0154	.0199	.0224	.0383	.0792	.0727	.0634	.0451	.0336	.9485
.9897	.0153	.0154	.0199	.0224	.0383	.0792	.0727	.0634	.0451	.0336	.9897
1.0309	.0404	.0405	.0450	.0475	.0611	.0929	.0864	.0748	.0588	.0473	1.0309

TABLE VI.- SURFACE-PRESSURE COEFFICIENTS AT $M_\infty = 4.63$ - Concluded

(c) $\alpha = 8°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.7169	1.7149	1.7121	1.7148	1.7103	1.7169	1.7149	1.7121	1.7148	1.7103	.0000
.0206	1.5481	1.5509	1.5753	1.6055	1.6419	1.7625	1.7559	1.7304	1.7057	1.6647	.0206
.0412	1.3429	1.3504	1.3837	1.4369	1.4961	1.6895	1.6785	1.6391	1.5736	1.5007	.0412
.0619	.9916	1.0041	1.0508	1.1271	1.2182	1.4843	1.4643	1.4065	1.3184	1.2227	.0619
.0825	.6860	.7034	.7406	.8081	.8993	1.2151	1.1864	1.1238	1.0268	.9220	.0825
.1031	.4443	.4528	.4898	.5530	.6396	.9095	.8902	.8227	.7307	.6350	.1031
.1237	.2299	.2478	.2709	.3206	.3890	.5902	.5758	.5263	.4528	.3799	.1237
.1443	.1113	.1156	.1340	.1703	.2158	.3850	.3662	.3302	.2705	.2204	.1443
.1649	.0748	.0336	.0428	.0700	.0974	.2162	.2067	.1751	.1384	.1019	.1649
.1856	.0565	.0154	.0291	.0473	.0746	.1842	.1749	.1523	.1156	.0837	.1856
.2062	.0520	.0154	.0246	.0427	.0700						.2062
.2474	.0199	.0222	.0314	.0498	.0770	.1704	.1612	.1386	.1023	.0704	.2474
.2887	.0199	.0199	.0292	.0452	.0679	.1590	.1498	.1272	.0932	.0635	.2887
.3299	.0176	.0177	.0246	.0407	.0611	.1499	.1407	.1181	.0863	.0567	.3299
.3711	.0130	.0154	.0200	.0338	.0542	.1408	.1339	.1090	.0772	.0498	.3711
.4124	.0130	.0131	.0177	.0293	.0520	.1385	.1293	.1044	.0726	.0452	.4124
.4536	.0108	.0108	.0155	.0270	.0474	.1339	.1270	.1021	.0681	.0407	.4536
.4948	.0108	.0086	.0132	.0224	.0451	.1316	.1248	.0999	.0658	.0384	.4948
.5361	.0085	.0086	.0109	.0201	.0428	.1316	.1225	.0976	.0635	.0361	.5361
.5773	.0085	.0086	.0086	.0178	.0406	.1316	.1225	.0953	.0612	.0338	.5773
.6186	.0062	.0063	.0063	.0178	.0383	.1316	.1225	.0976	.0612	.0315	.6186
.6598	.0062	.0063	.0063	.0156	.0360	.1316	.1225	.0976	.0612	.0315	.6598
.7010	.0039	.0040	.0041	.0133	.0360	.1339	.1248	.0976	.0612	.0293	.7010
.7423	.0039	.0040	.0041	.0133	.0360	.1339	.1248	.0976	.0612	.0293	.7423
.7835	.0039	.0040	.0018	.0110	.0337	.1362	.1270	.0976	.0612	.0293	.7835
.8247	.0039	.0017	.0018	.0110	.0337	.1385	.1270	.0999	.0612	.0293	.8247
.8660	.0017	.0017	.0018	.0110	.0337	.1408	.1293	.0999	.0612	.0270	.8660
.9072	.0017	.0017	-.0005	.0087	.0337	.1408	.1316	.1021	.0612	.0270	.9072
.9485	.0017	-.0006	-.0005	.0087	.0337	.1430	.1339	.1021	.0612	.0270	.9485
.9897	.0017	-.0006	-.0005	.0087	.0337	.1476	.1362	.1044	.0635	.0270	.9897
1.0309	.0267	.0268	.0269	.0361	.0565	.1567	.1475	.1158	.0749	.0407	1.0309

(d) $\alpha = 12°$

Orifice station, s/l	C_p at meridian angle, θ, deg =										Orifice station, s/l
	90	67.5	45	22.5	0	270	247.5	225	202.5	180	
.0000	1.6646	1.6667	1.6647	1.7558	1.6670	1.6646	1.6667	1.6647	1.7558	1.6670	.0000
.0206	1.4550	1.4615	1.4961	1.5417	1.5940	1.7557	1.7397	1.7103	1.7604	1.6214	.0206
.0412	1.2318	1.2562	1.2956	1.3640	1.4571	1.7284	1.7124	1.6465	1.5599	1.4571	.0412
.0619	.8627	.8913	.9539	1.0587	1.1834	1.5735	1.5390	1.4551	1.3275	1.1880	.0619
.0825	.5803	.5948	.6532	.7489	.8732	1.3229	1.2881	1.1863	1.0451	.8960	.0825
.1031	.3525	.3667	.4163	.5029	.6222	1.0359	.9962	.8537	.7626	.6222	.1031
.1237	.1748	.1842	.2250	.2887	.3805	.7033	.6723	.5894	.4801	.3668	.1237
.1443	.1156	.0793	.1065	.1475	.2117	.4755	.4534	.3890	.2979	.2117	.1443
.1649	.0473	.0063	.0700	.0564	.0930	.2842	.2664	.2204	.1612	.0976	.1649
.1856	.0336	-.0073	.0518	.0382	.0748	.2523	.2299	.1885	.1338	.0793	.1856
.2062	.0336	-.0119	.0518	.0336	.0702						.2062
.2474	.0017	.0064	.0177	.0384	.0770	.2280	.2142	.1751	.1227	.0704	.2474
.2887	.0017	.0041	.0132	.0315	.0679	.2166	.2005	.1637	.1113	.0635	.2887
.3299	.0017	.0018	.0086	.0270	.0588	.2075	.1937	.1546	.1044	.0567	.3299
.3711	.0017	.0018	.0063	.0224	.0520	.2029	.1868	.1478	.0953	.0498	.3711
.4124	.0017	-.0005	.0041	.0178	.0497	.2006	.1846	.1432	.0930	.0452	.4124
.4536	-.0005	-.0005	-.0005	.0133	.0451	.2006	.1823	.1409	.0885	.0407	.4536
.4948	-.0005	-.0028	-.0028	.0110	.0428	.2006	.1823	.1409	.0862	.0361	.4948
.5361	-.0005	-.0028	-.0028	.0087	.0383	.2029	.1846	.1409	.0839	.0338	.5361
.5773	-.0005	-.0028	-.0051	.0041	.0360	.2052	.1868	.1409	.0839	.0315	.5773
.6186	-.0028	-.0051	-.0073	.0019	.0360	.2075	.1891	.1409	.0816	.0315	.6186
.6598	-.0028	-.0051	-.0096	-.0004	.0337	.2120	.1914	.1432	.0816	.0293	.6598
.7010	-.0028	-.0051	-.0096	-.0004	.0314	.2166	.1960	.1455	.0816	.0270	.7010
.7423	-.0028	-.0073	-.0119	-.0027	.0314	.2189	.1983	.1478	.0816	.0270	.7423
.7835	-.0028	-.0073	-.0119	-.0027	.0314	.2235	.2028	.1500	.0839	.0270	.7835
.8247	-.0051	-.0096	-.0142	-.0050	.0314	.2280	.2051	.1523	.0839	.0270	.8247
.8660	-.0051	-.0096	-.0142	-.0050	.0292	.2303	.2074	.1546	.0839	.0247	.8660
.9072	-.0051	-.0096	-.0142	-.0073	.0292	.2326	.2120	.1569	.0862	.0247	.9072
.9485	-.0051	-.0096	-.0142	-.0073	.0292	.2372	.2142	.1569	.0862	.0270	.9485
.9897	-.0028	-.0119	-.0142	-.0073	.0314	.2394	.2165	.1614	.0885	.0270	.9897
1.0309	.0245	.0178	.0132	.0201	.0542	.2486	.2279	.1706	.0999	.0384	1.0309

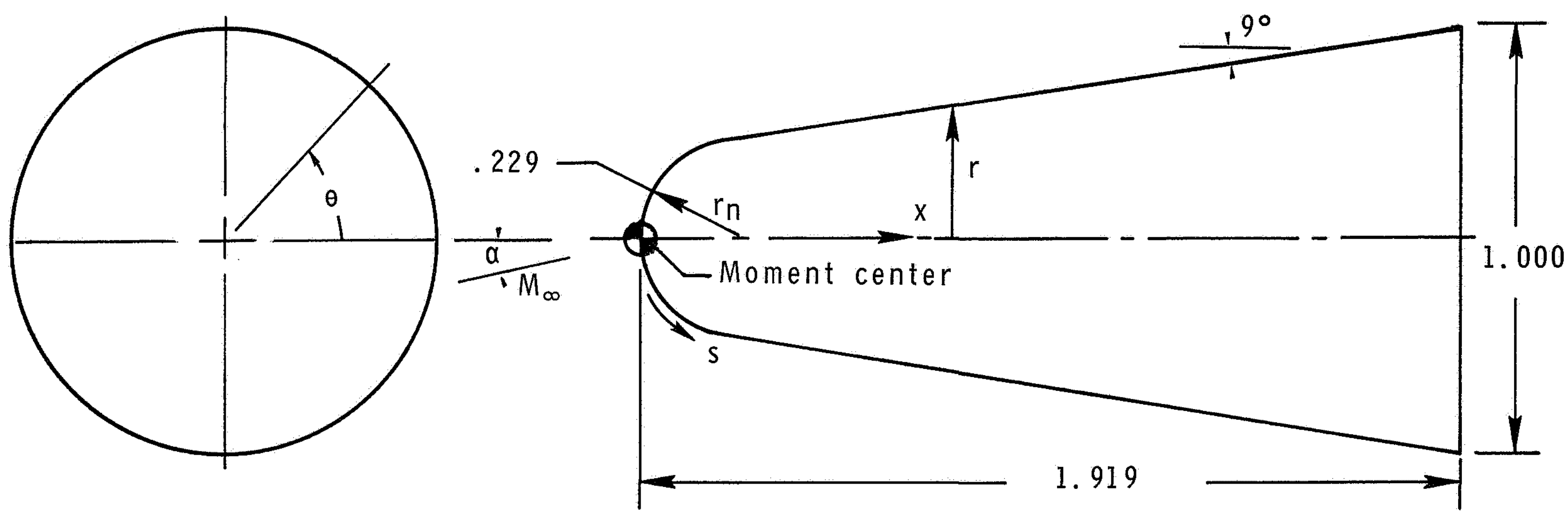


Figure 1.- Model details. (Model dimensions are in terms of the base diameter, $d = 0.526$ foot or 0.160 meter.)

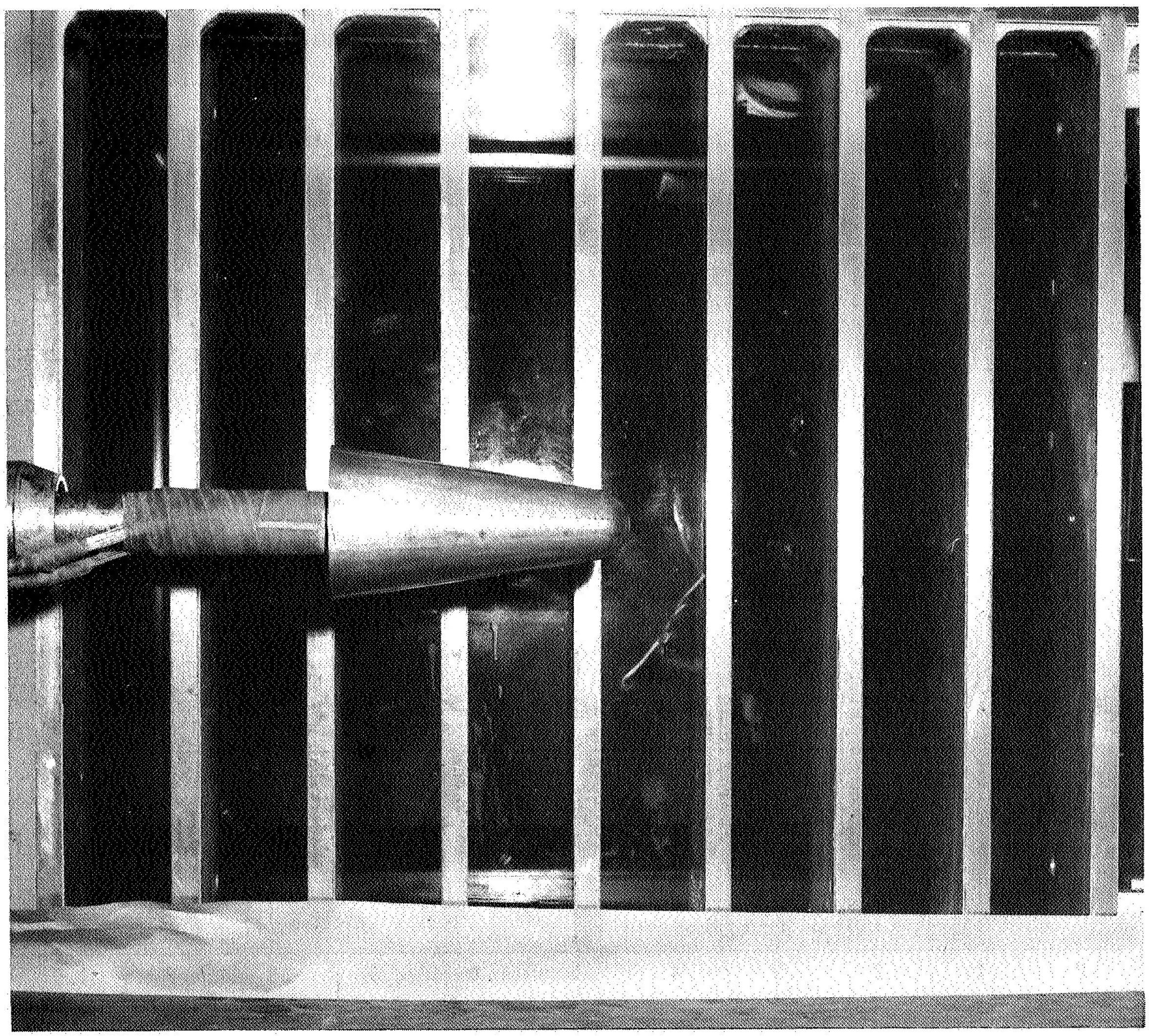
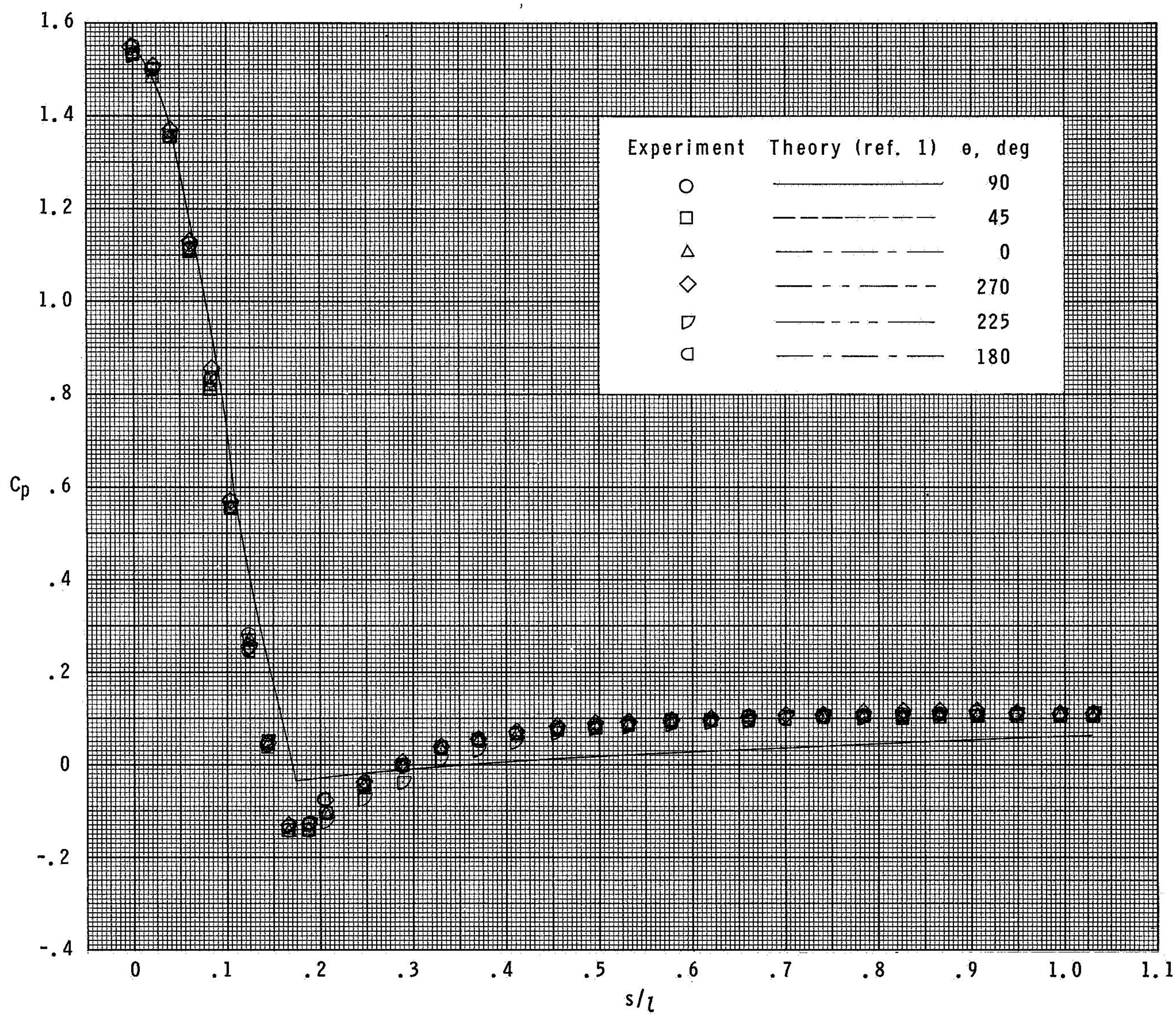
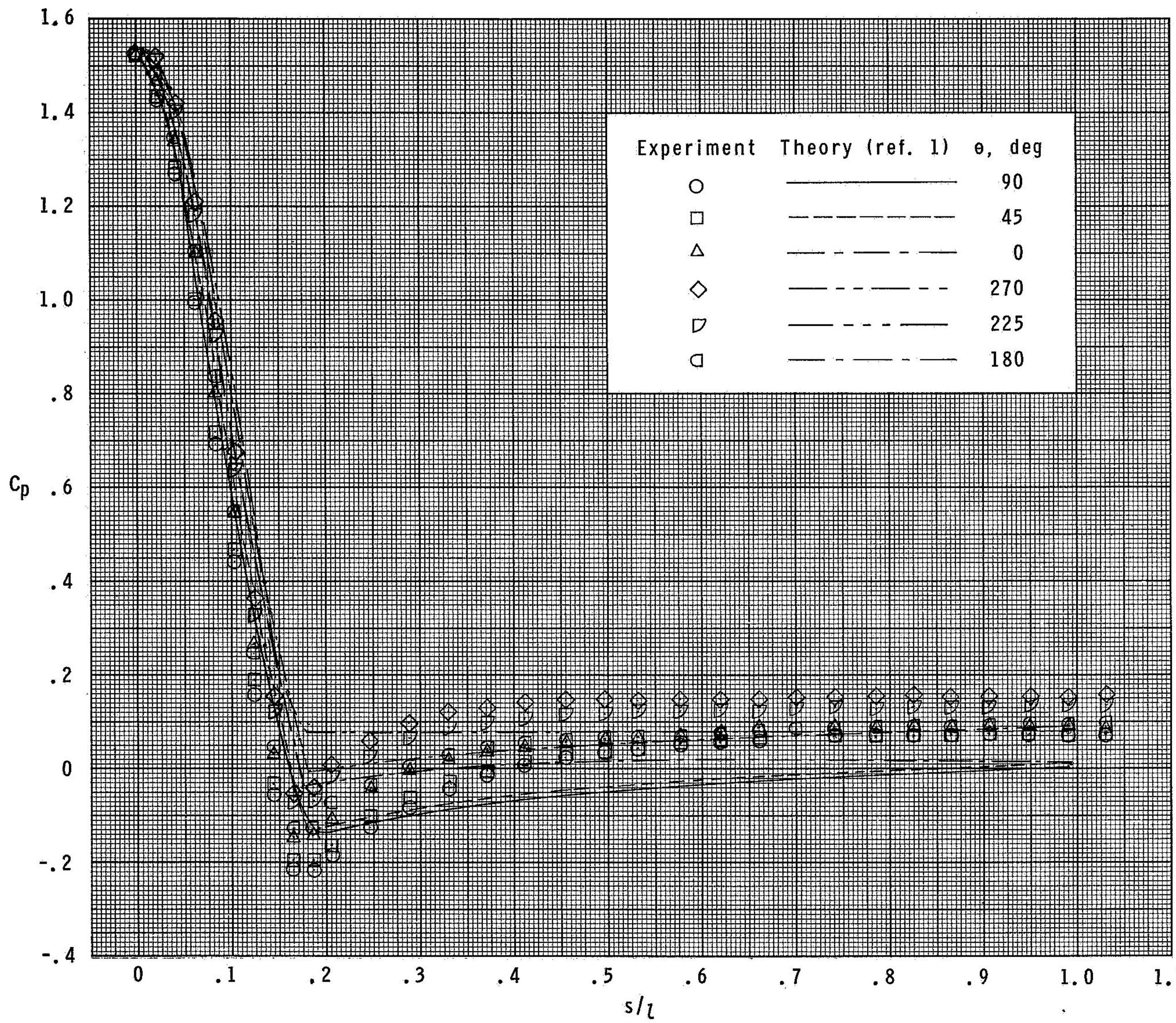


Figure 2.- Model photograph. L-66-9550



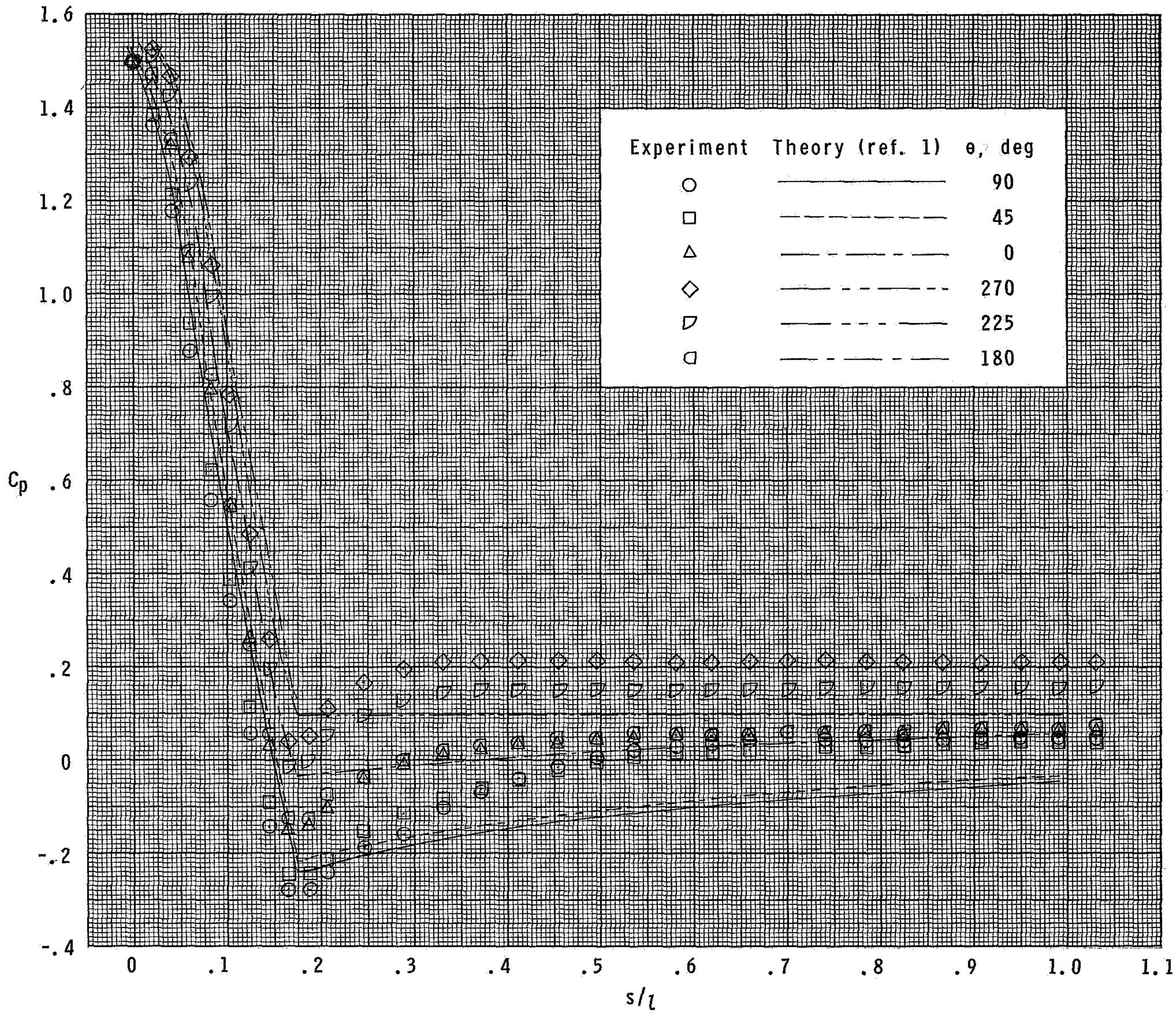
(a) $\alpha = 0^{\circ}$.

Figure 3.- Comparison of experimental and theoretical surface-pressure coefficients at $M_{\infty} = 1.50$.



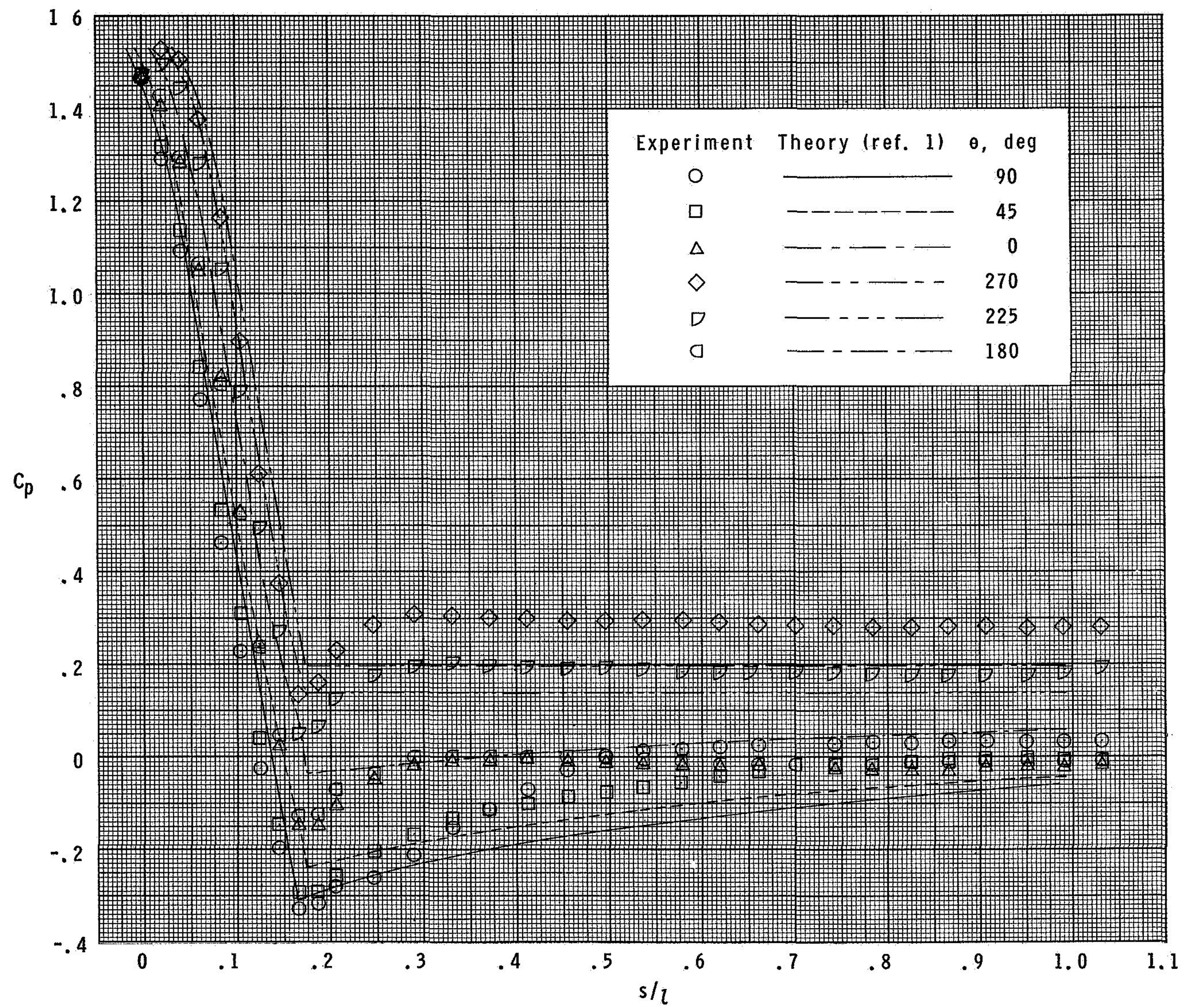
(b) $\alpha = 4^o$.

Figure 3.- Continued.



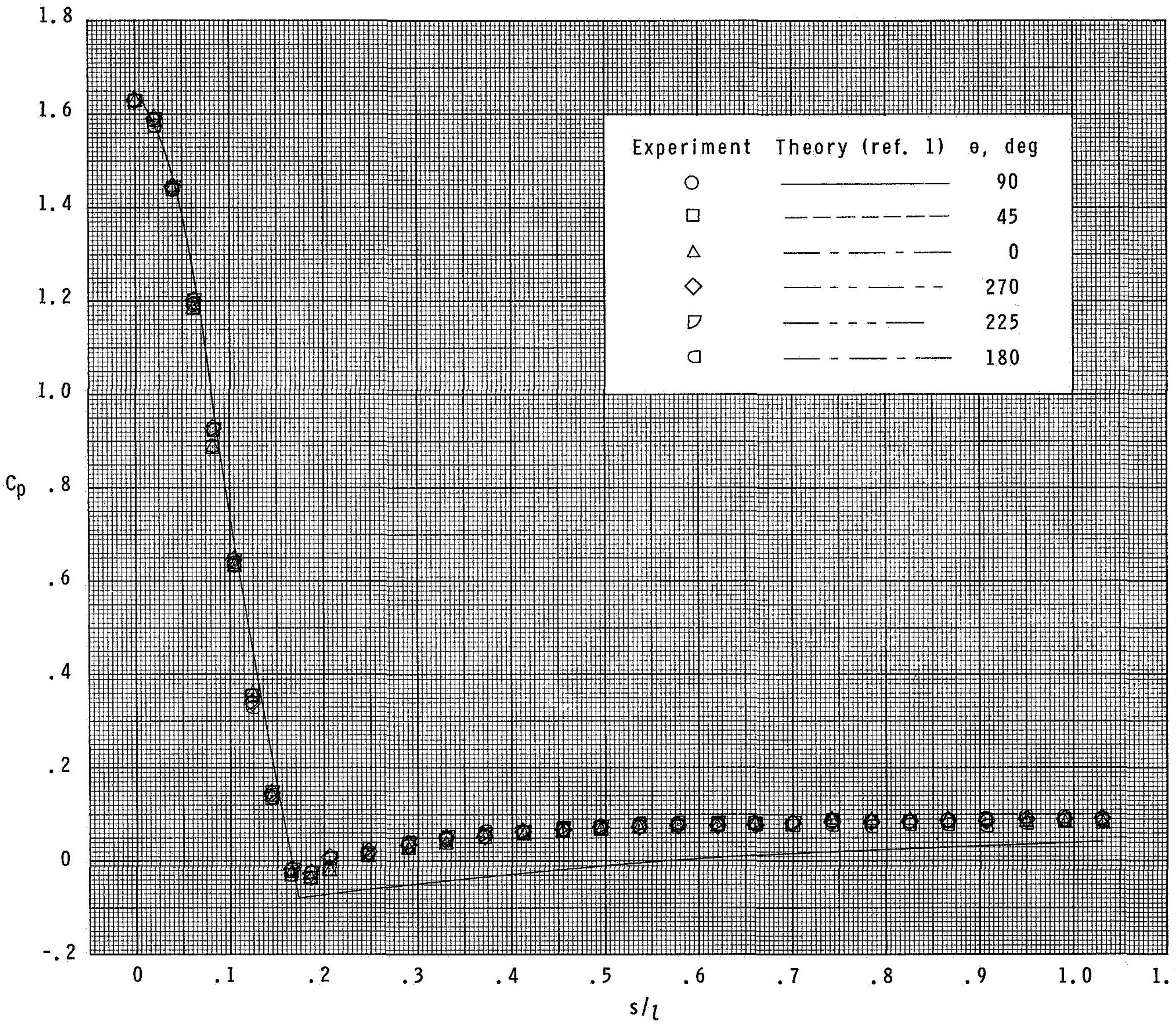
(c) α = 8°.

Figure 3.- Continued.



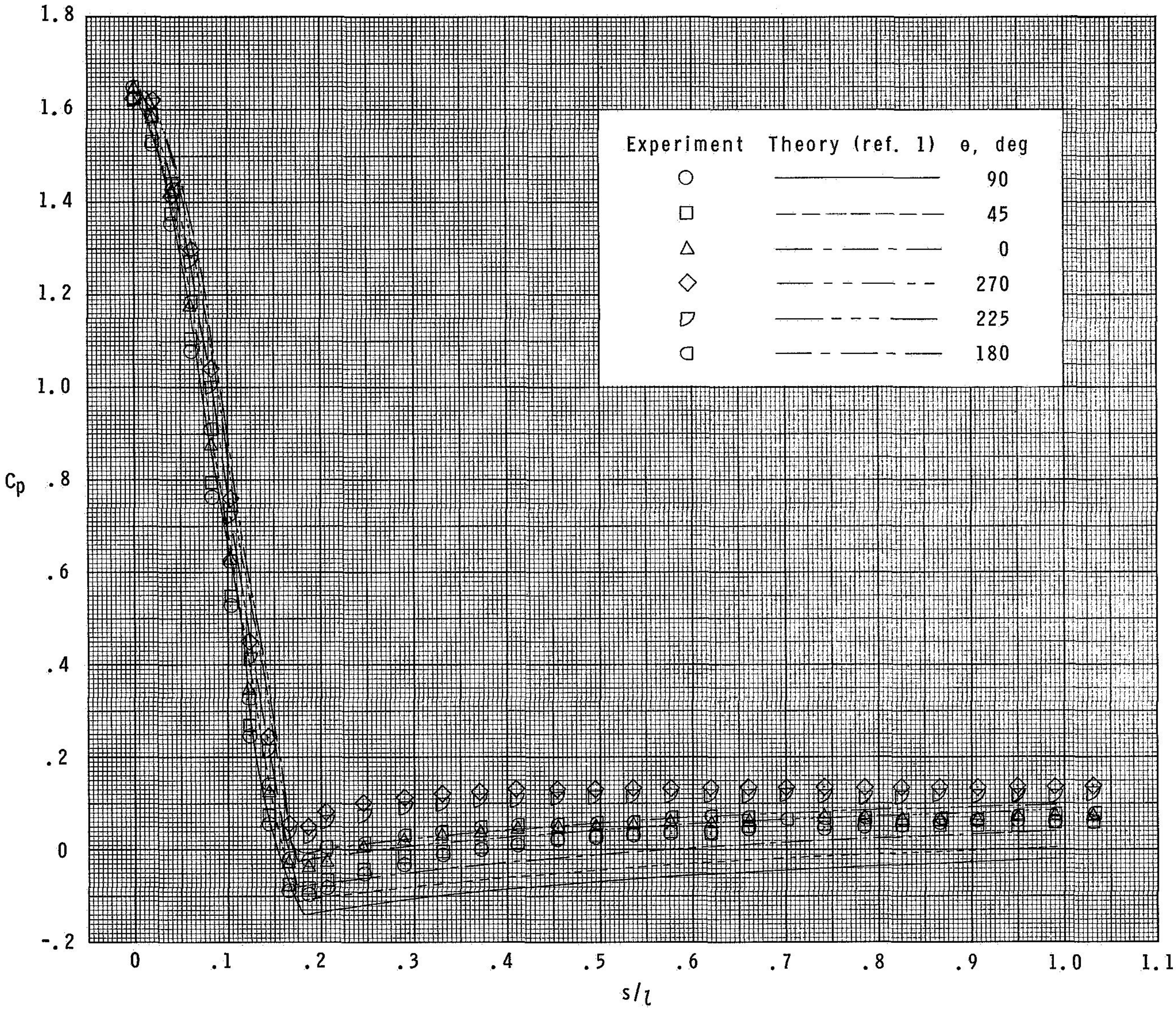
(d) $\alpha = 12^{0}$.

Figure 3.- Concluded.



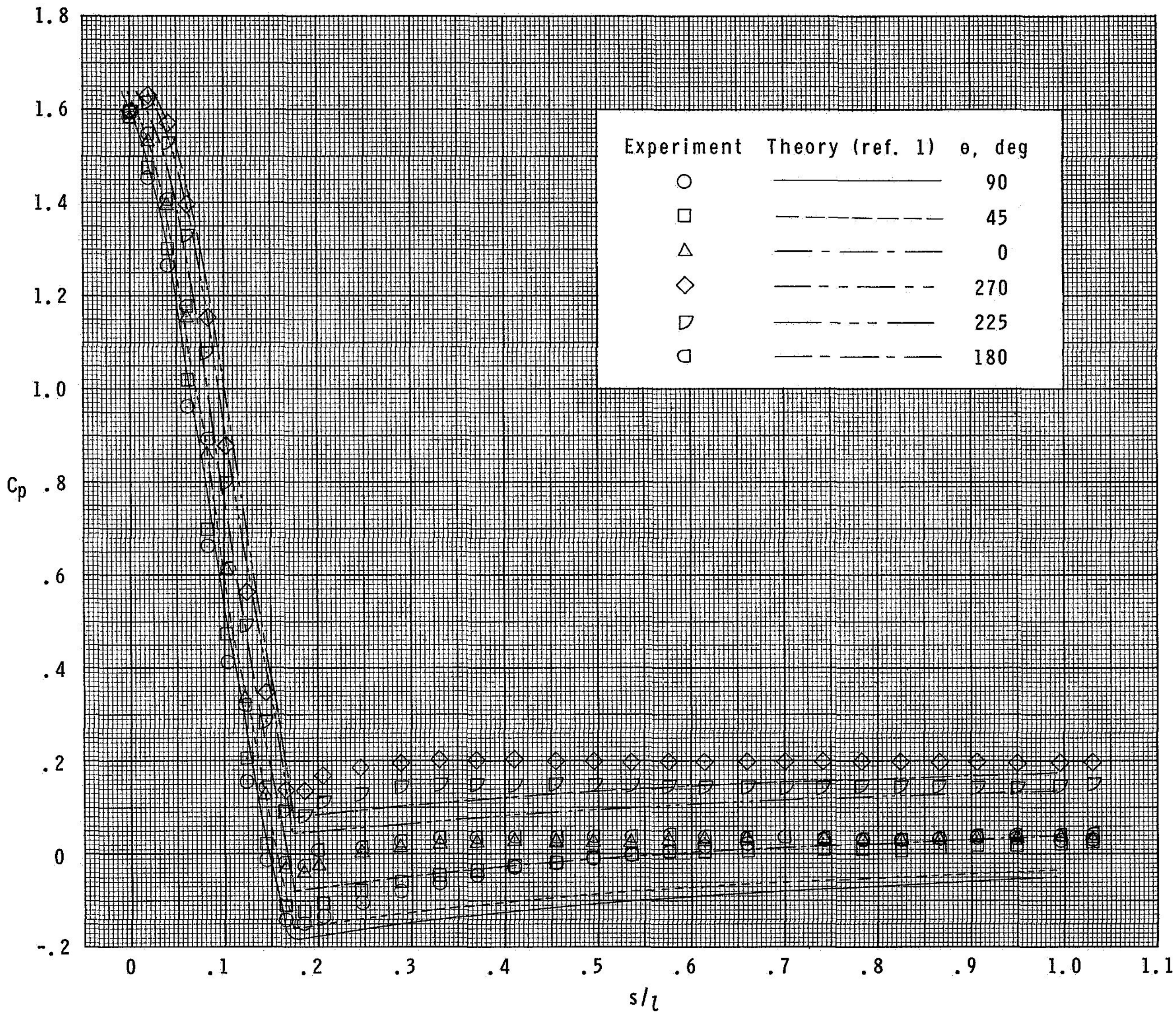
(a) $\alpha = 0^{\circ}$.

Figure 4.- Comparison of experimental and theoretical surface-pressure coefficients at $M_{\infty} = 1.90$.



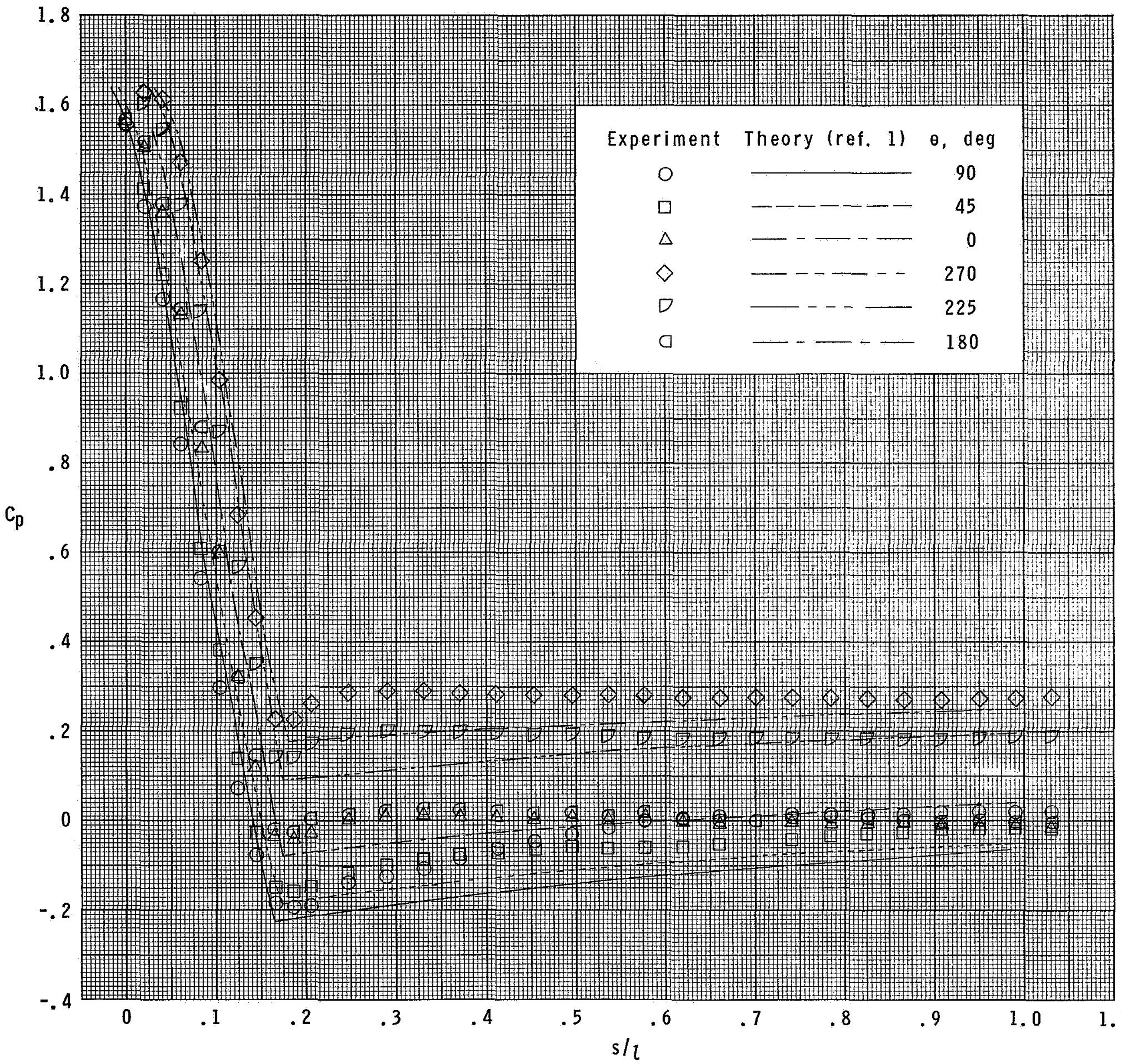
(b) $\alpha = 4^o$.

Figure 4.- Continued.



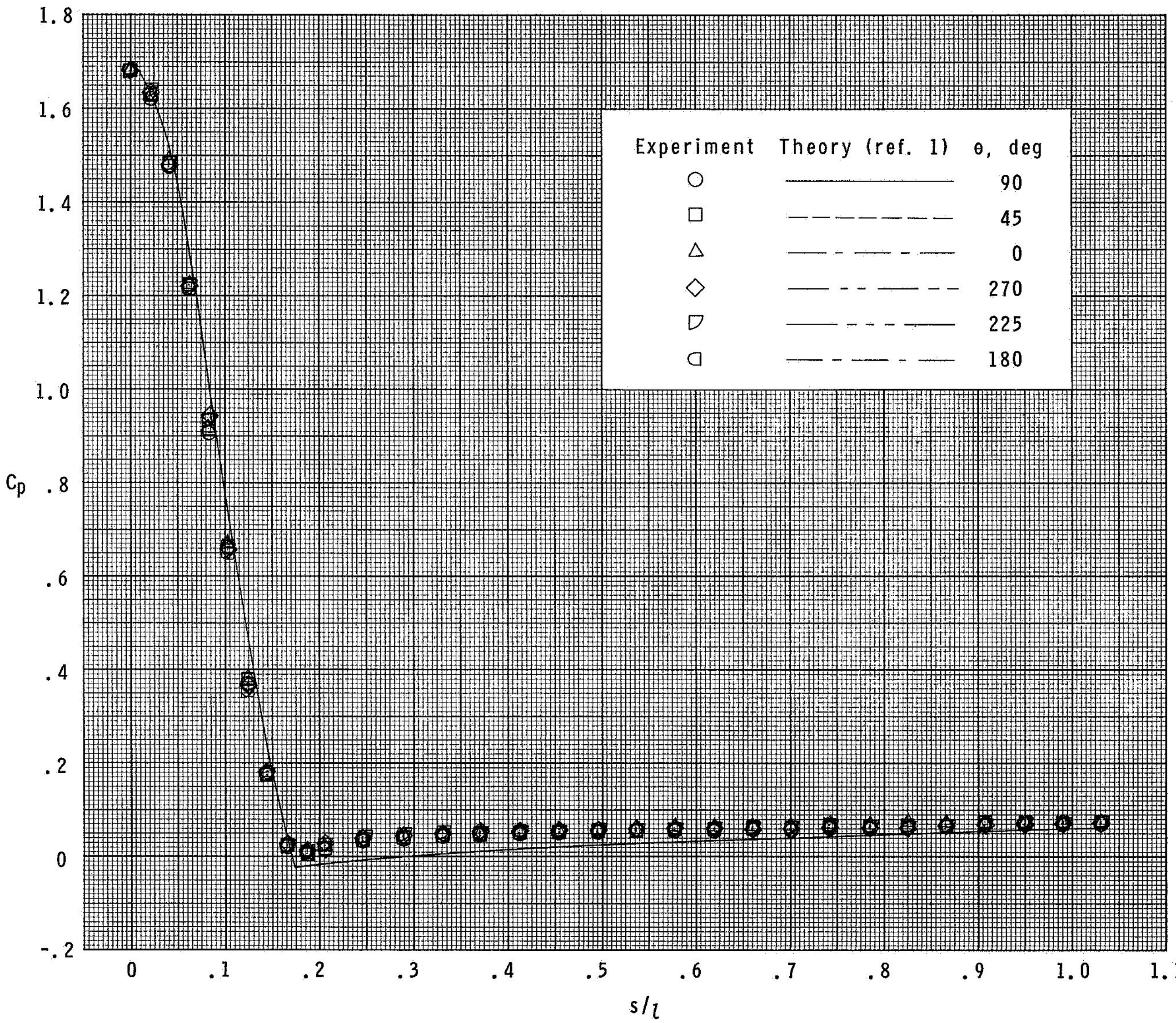
(c) α = 8°.

Figure 4.- Continued.



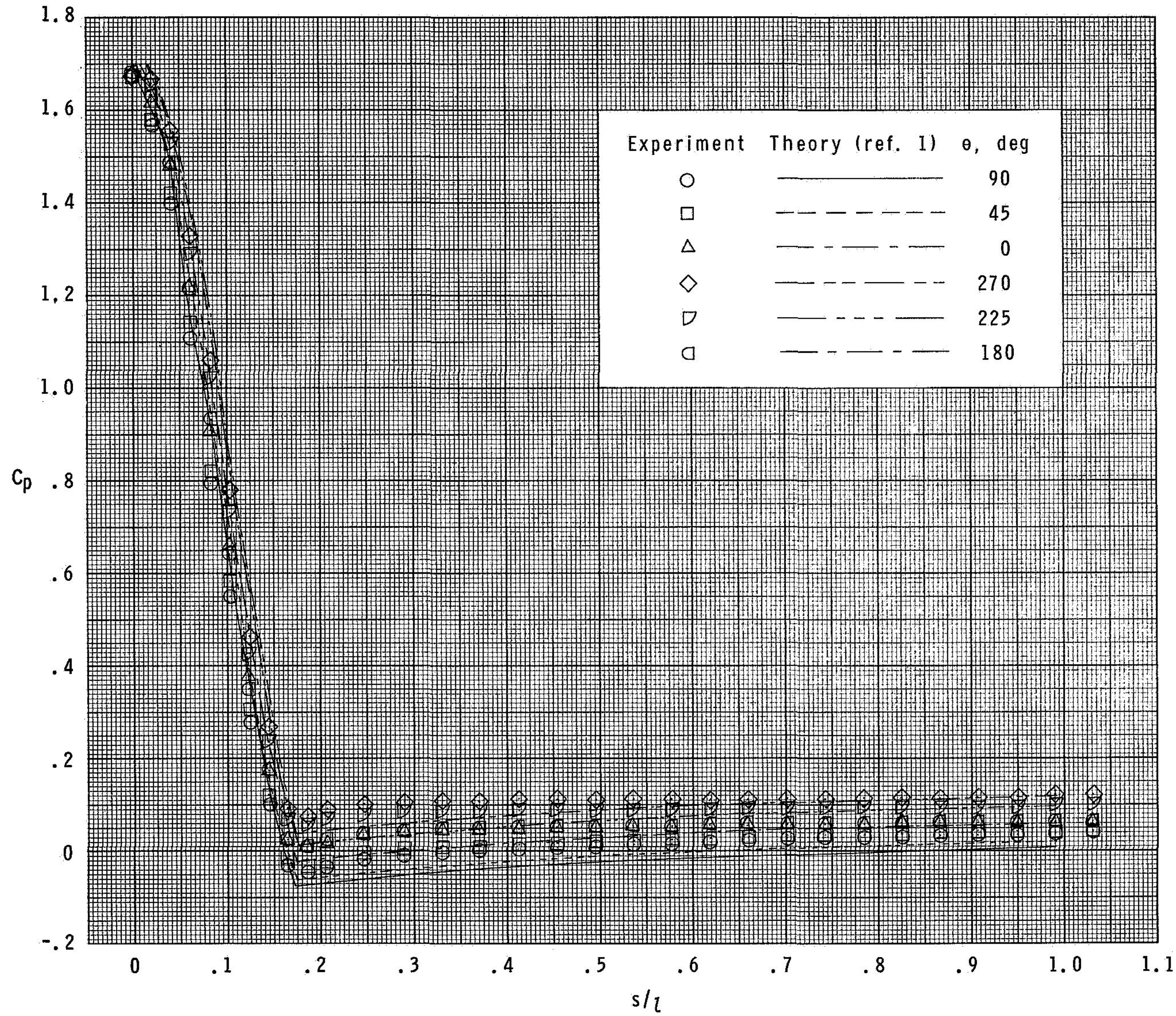
(d) $\alpha = 12^{\circ}$.

Figure 4.- Concluded.



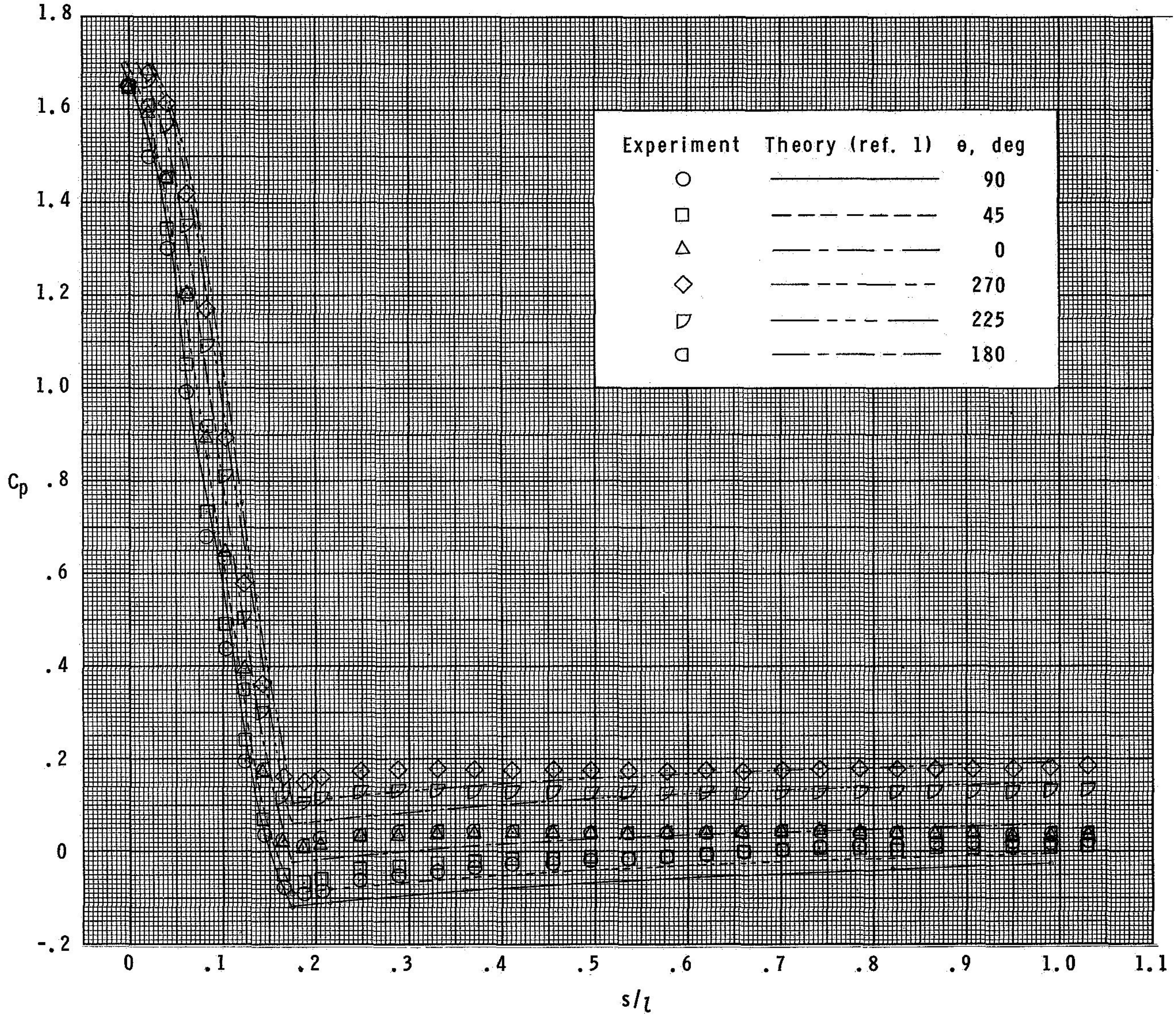
(a) $\alpha = 0^{\circ}$.

Figure 5.- Comparison of experimental and theoretical surface-pressure coefficients at $M_{\infty} = 2.30$.



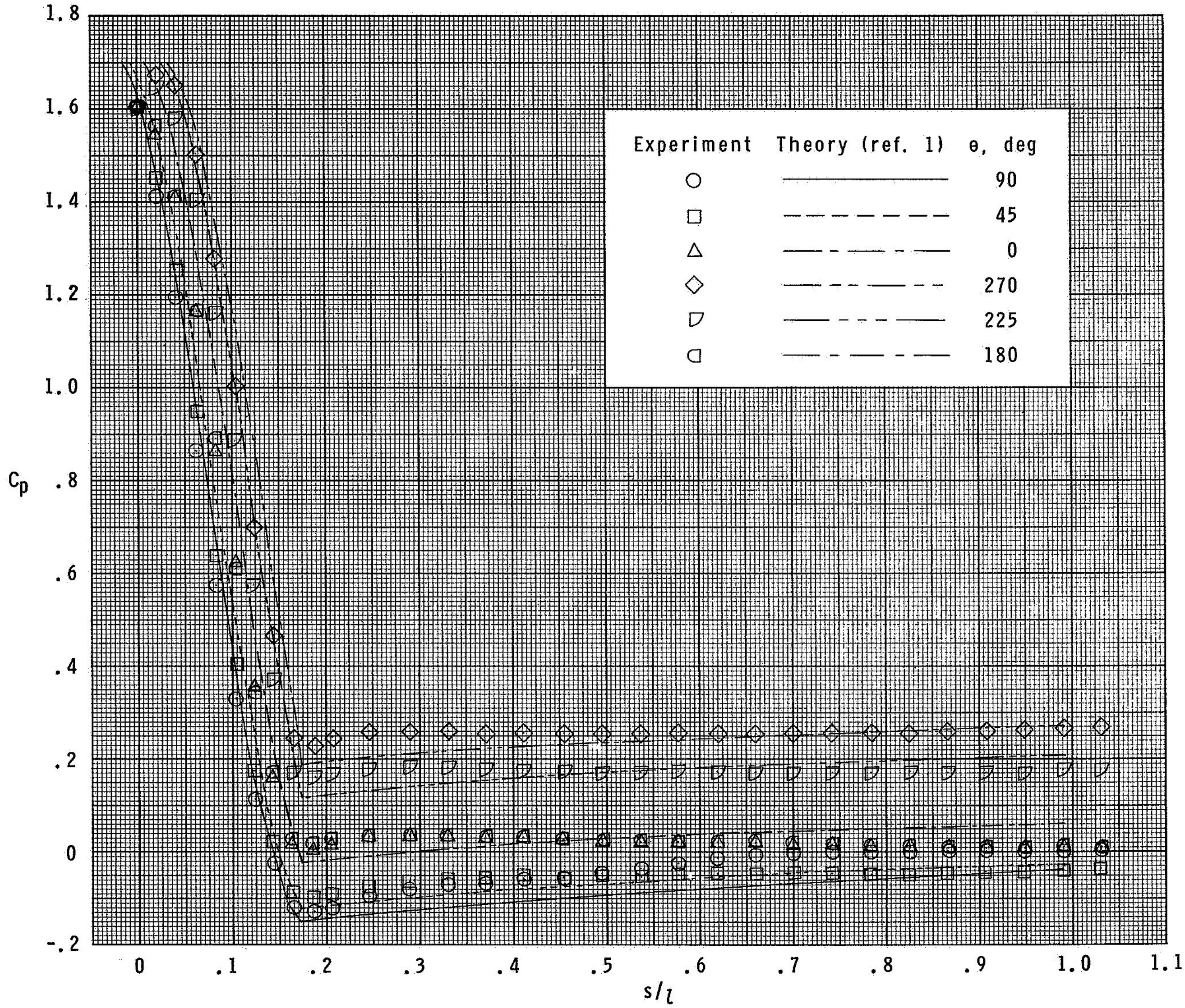
(b) $\alpha = 4^{o}$.

Figure 5.- Continued.



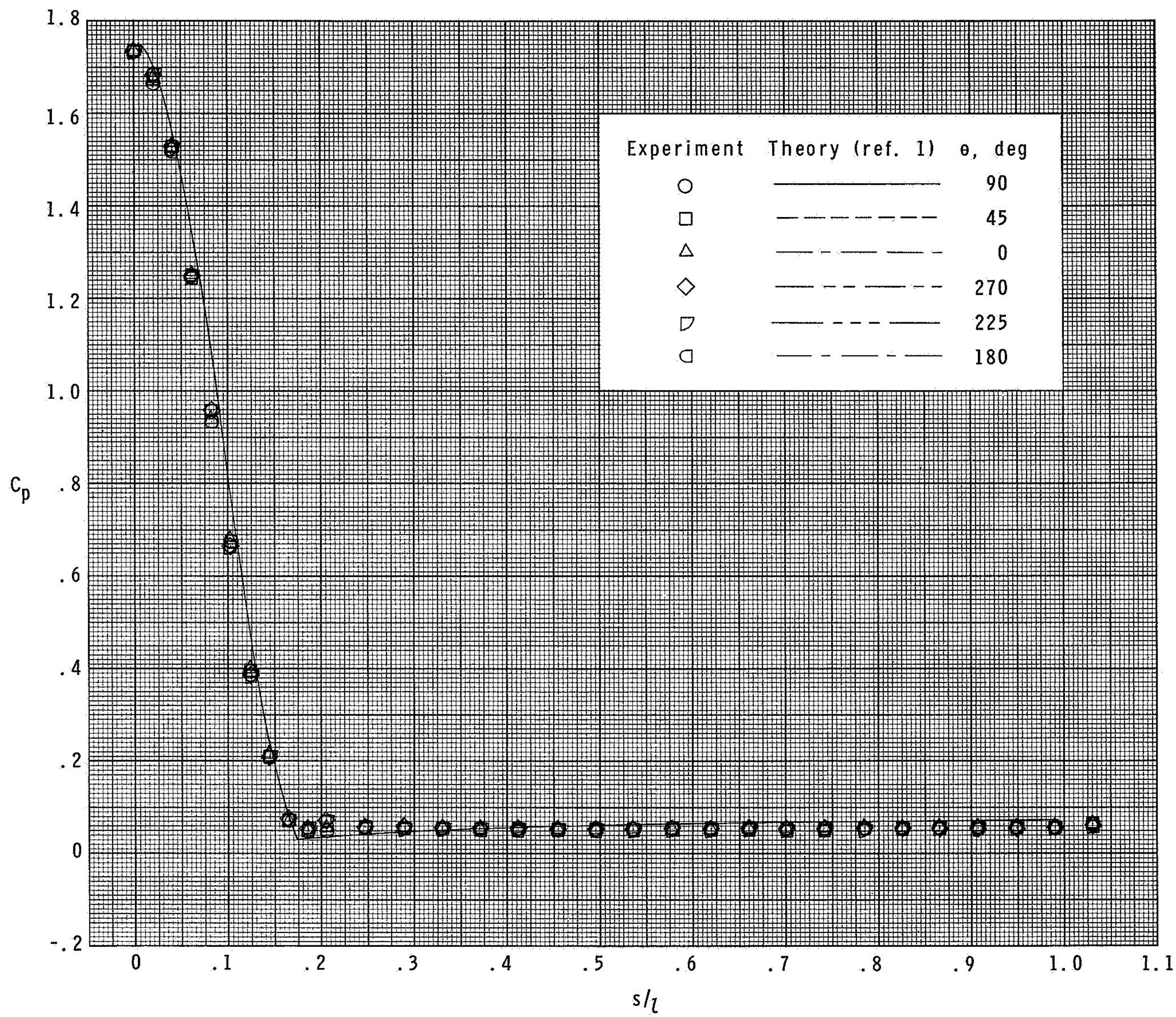
(c) $\alpha = 8^{0}$.

Figure 5.- Continued.



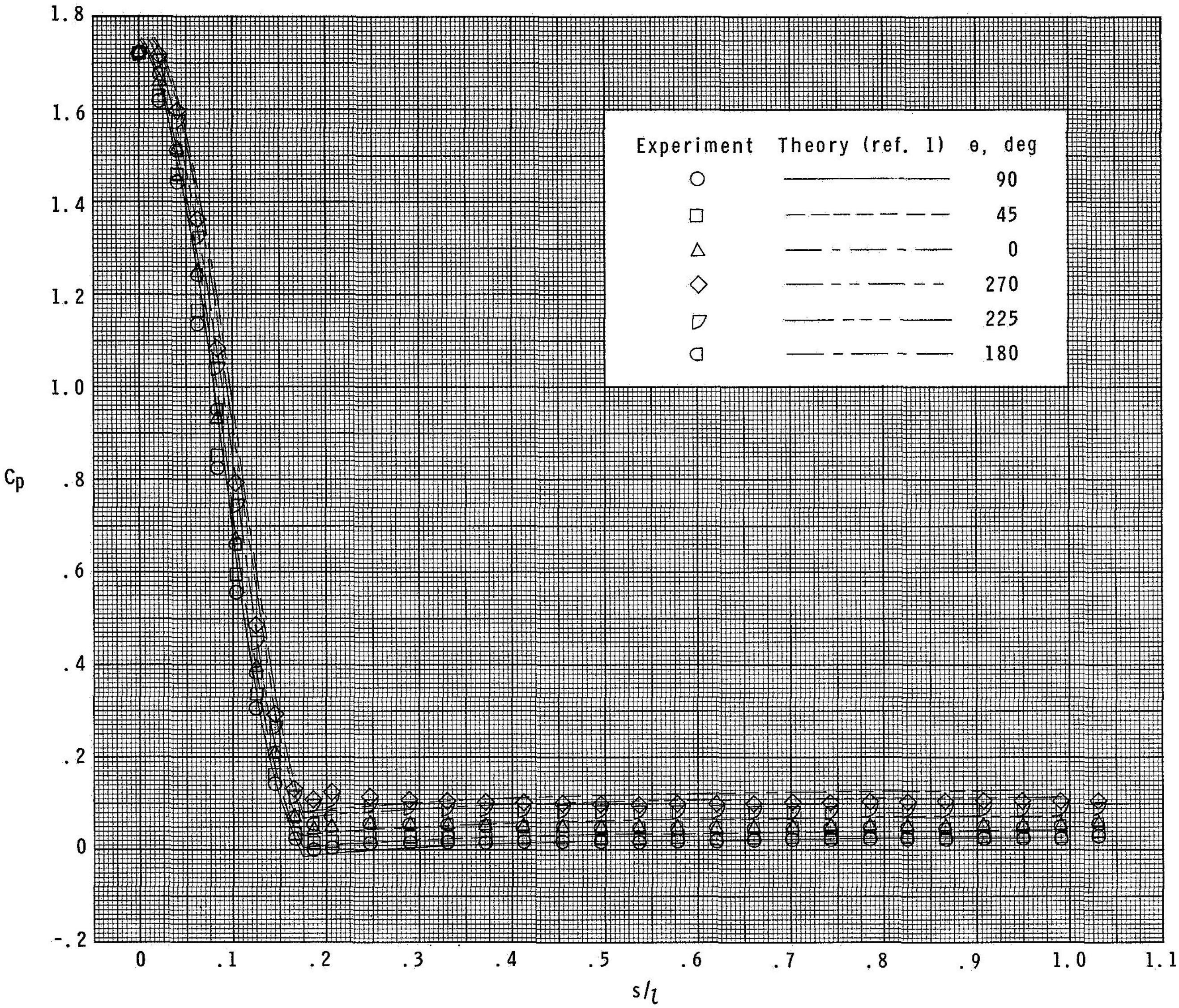
(d) $\alpha = 12^0$.

Figure 5.- Concluded.



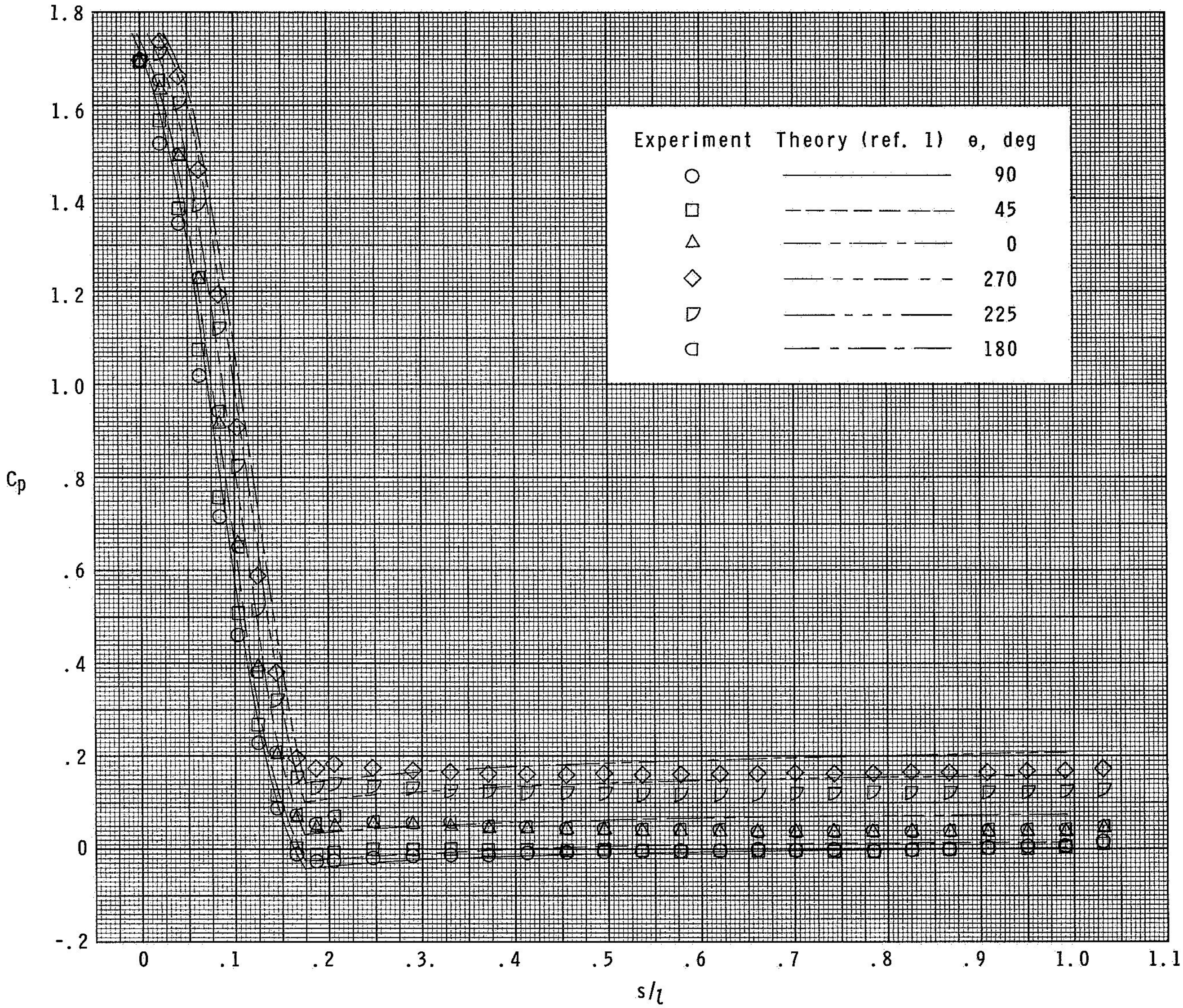
(a) $\alpha = 0^{\circ}$.

Figure 6.- Comparison of experimental and theoretical surface-pressure coefficients at $M_{\infty} = 2.96$.



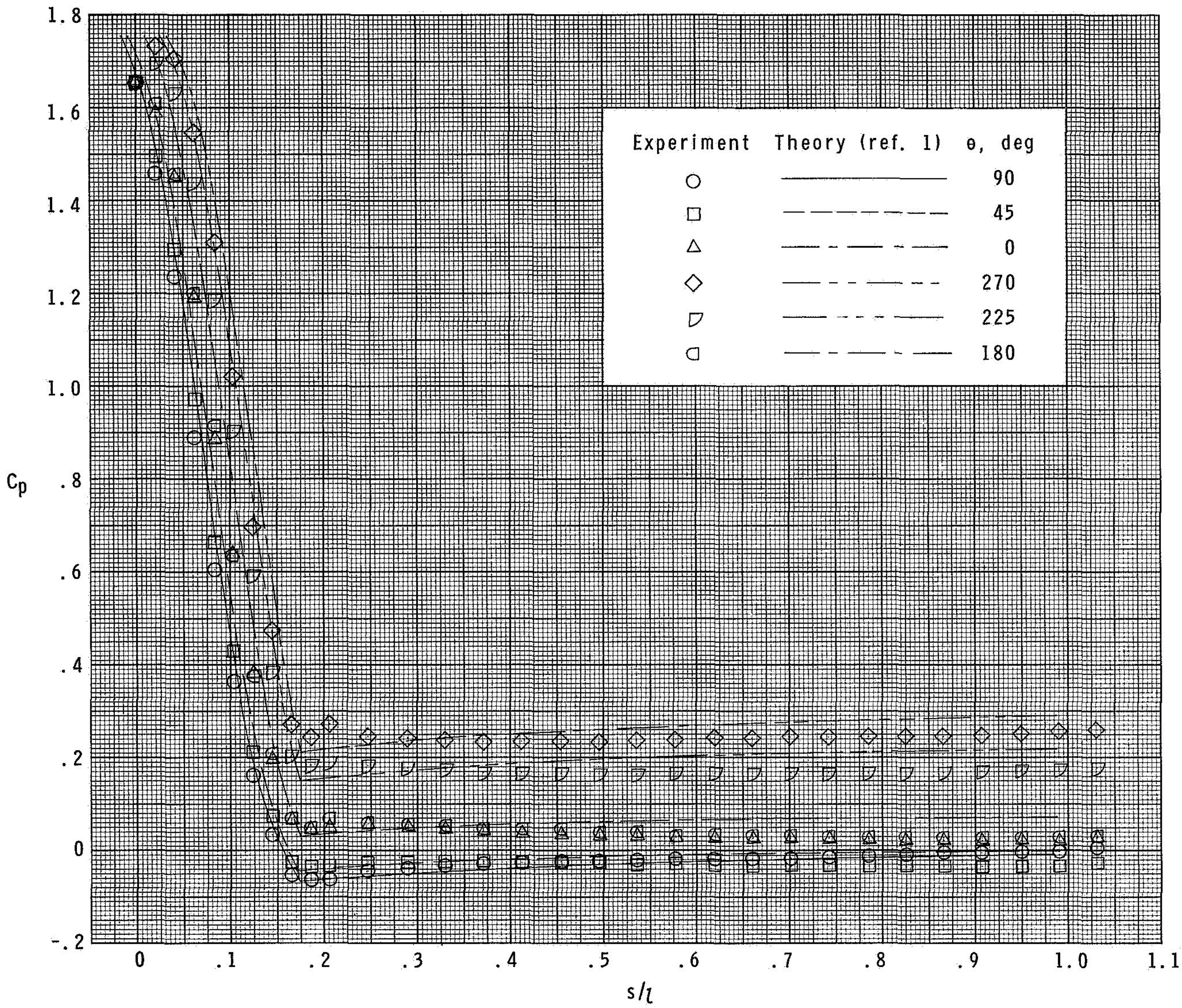
(b) $\alpha = 4^{\circ}$.

Figure 6.- Continued.



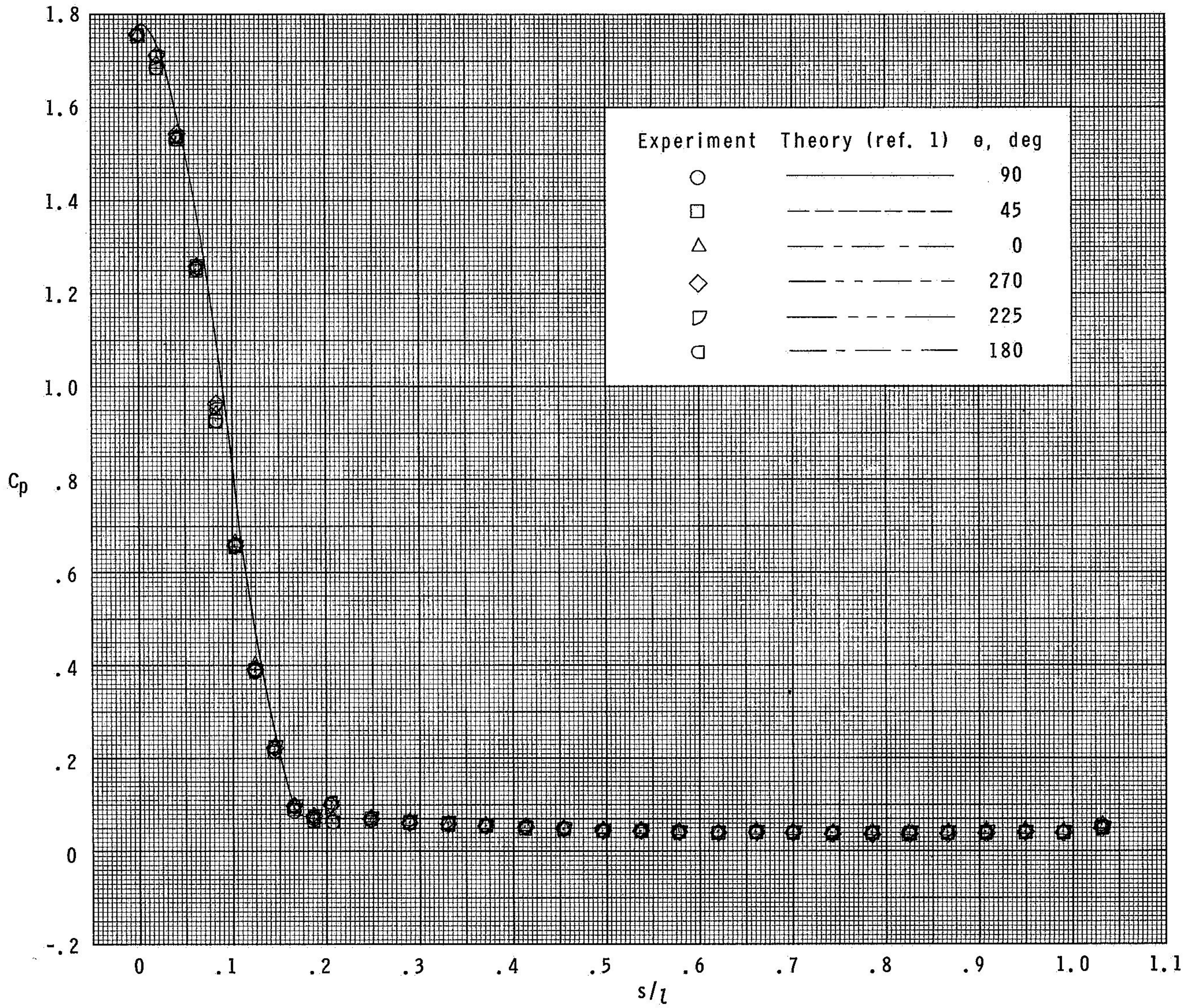
(c) α = 8°.

Figure 6.- Continued.



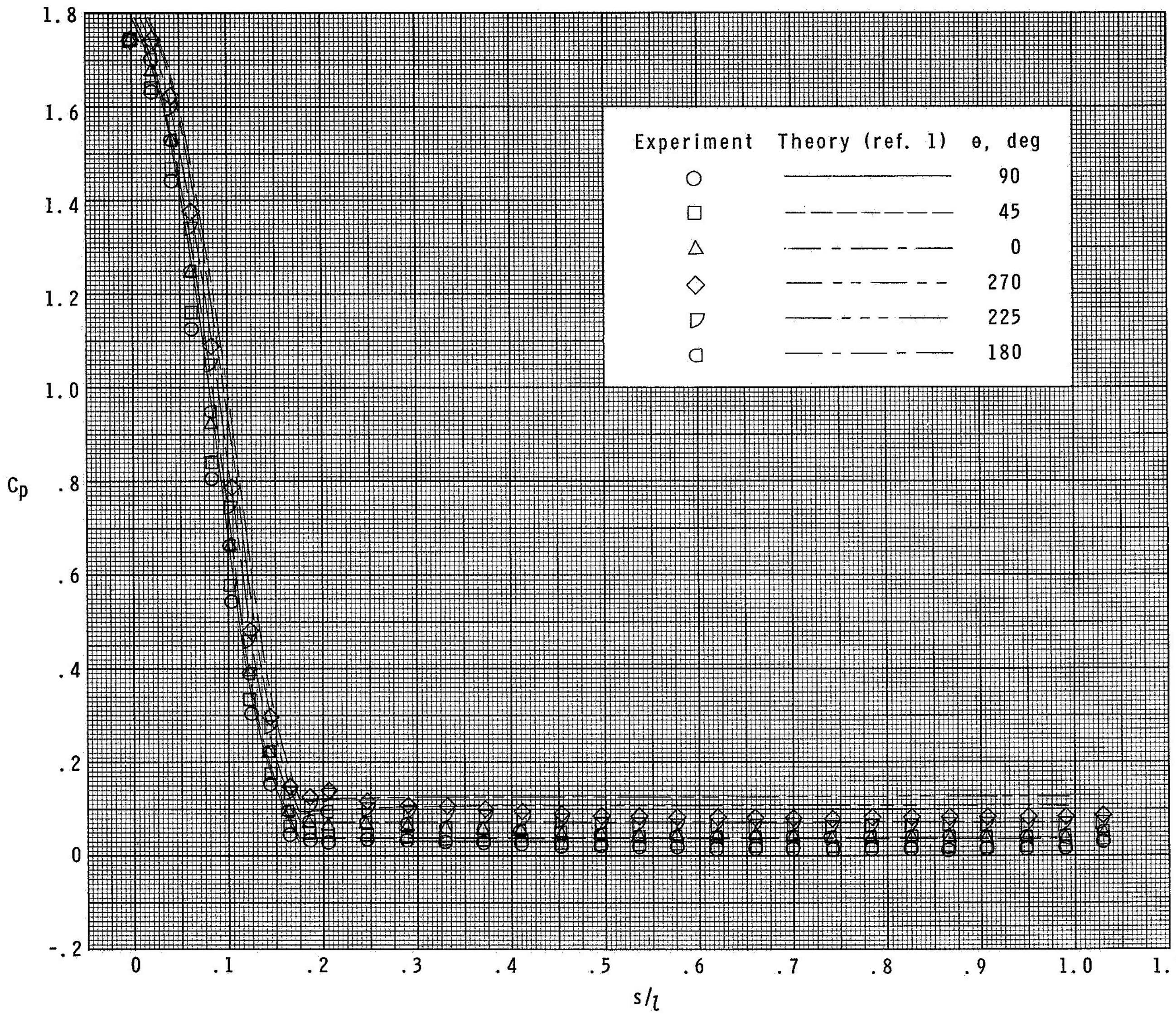
(d) α = 12°.

Figure 6.- Concluded.



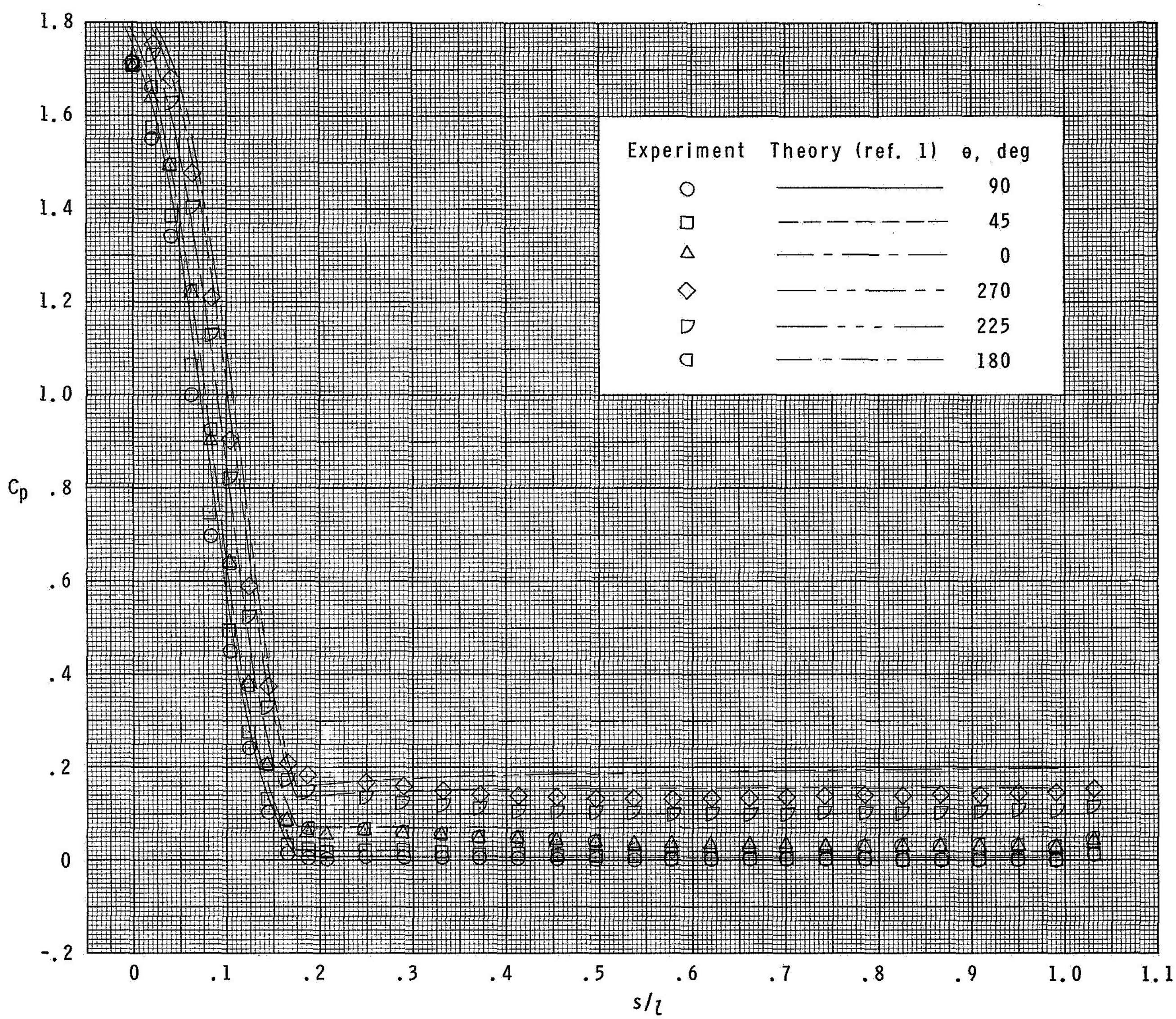
(a) $\alpha = 0^{\circ}$.

Figure 7.- Comparison of experimental and theoretical surface-pressure coefficients at $M_{\infty} = 3.95$.



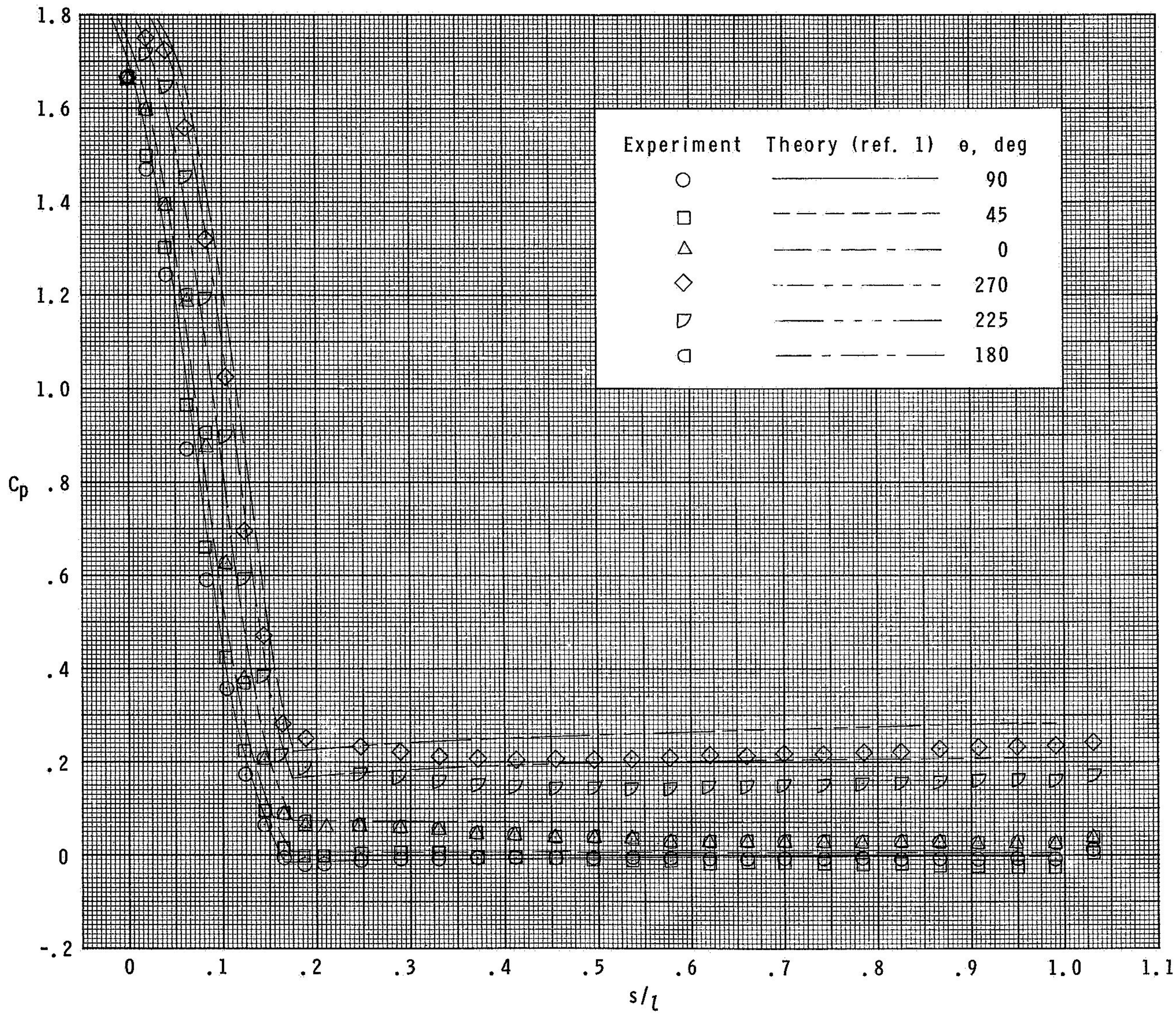
(b) $\alpha = 4^{\circ}$.

Figure 7.- Continued.



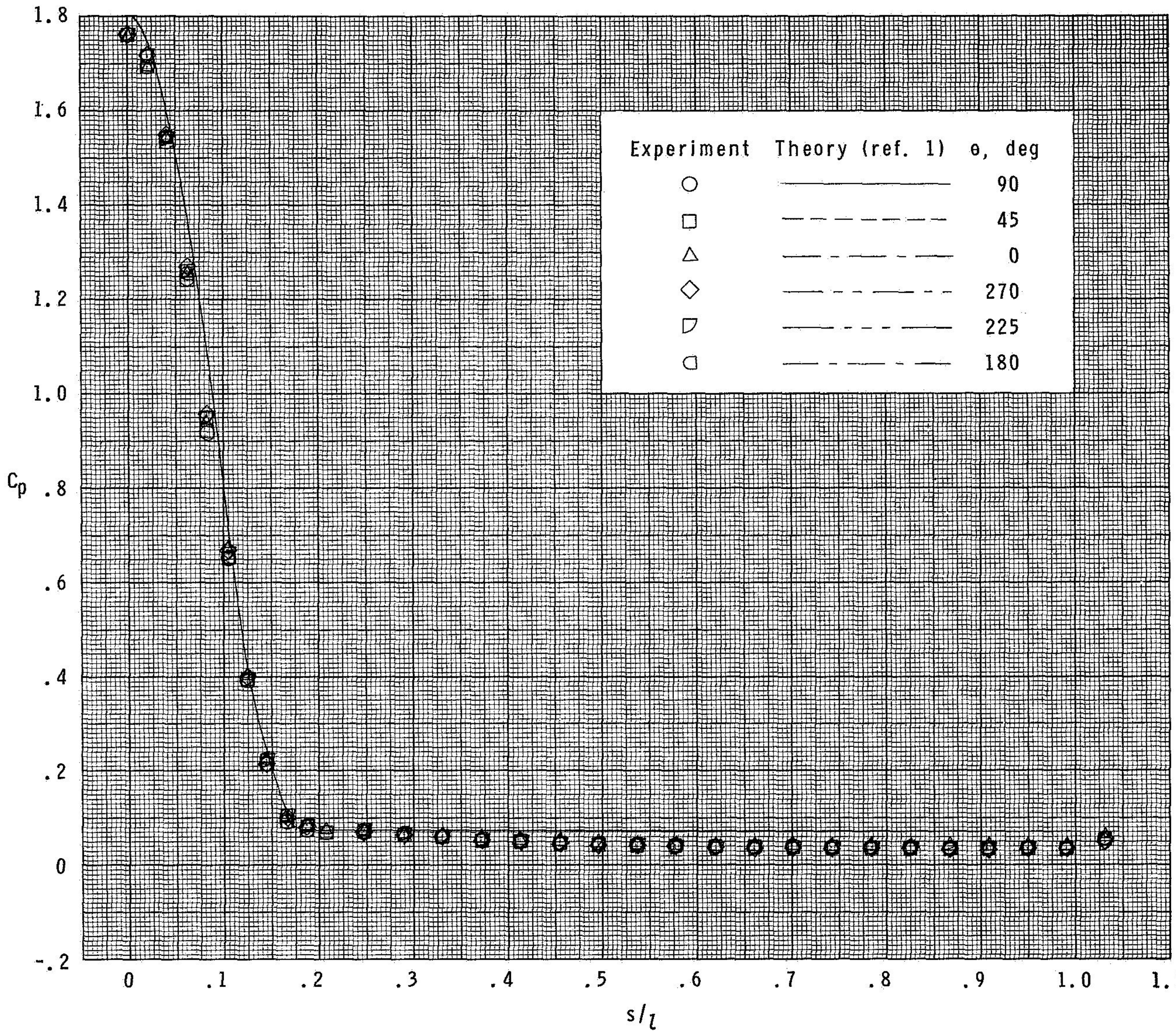
(c) $\alpha = 8^{0}$.

Figure 7.- Continued.



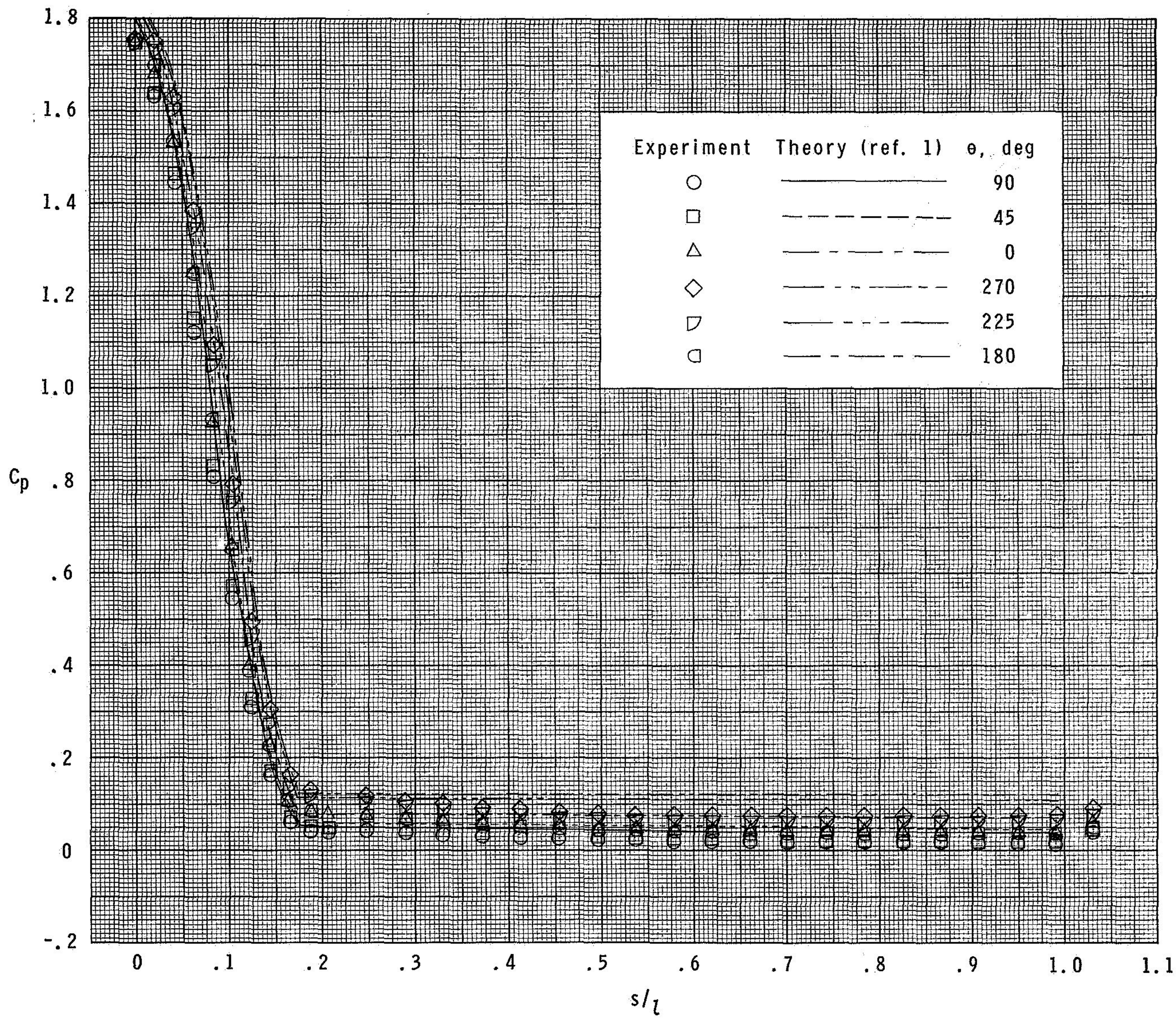
(d) $\alpha = 12^o$.

Figure 7.- Concluded.



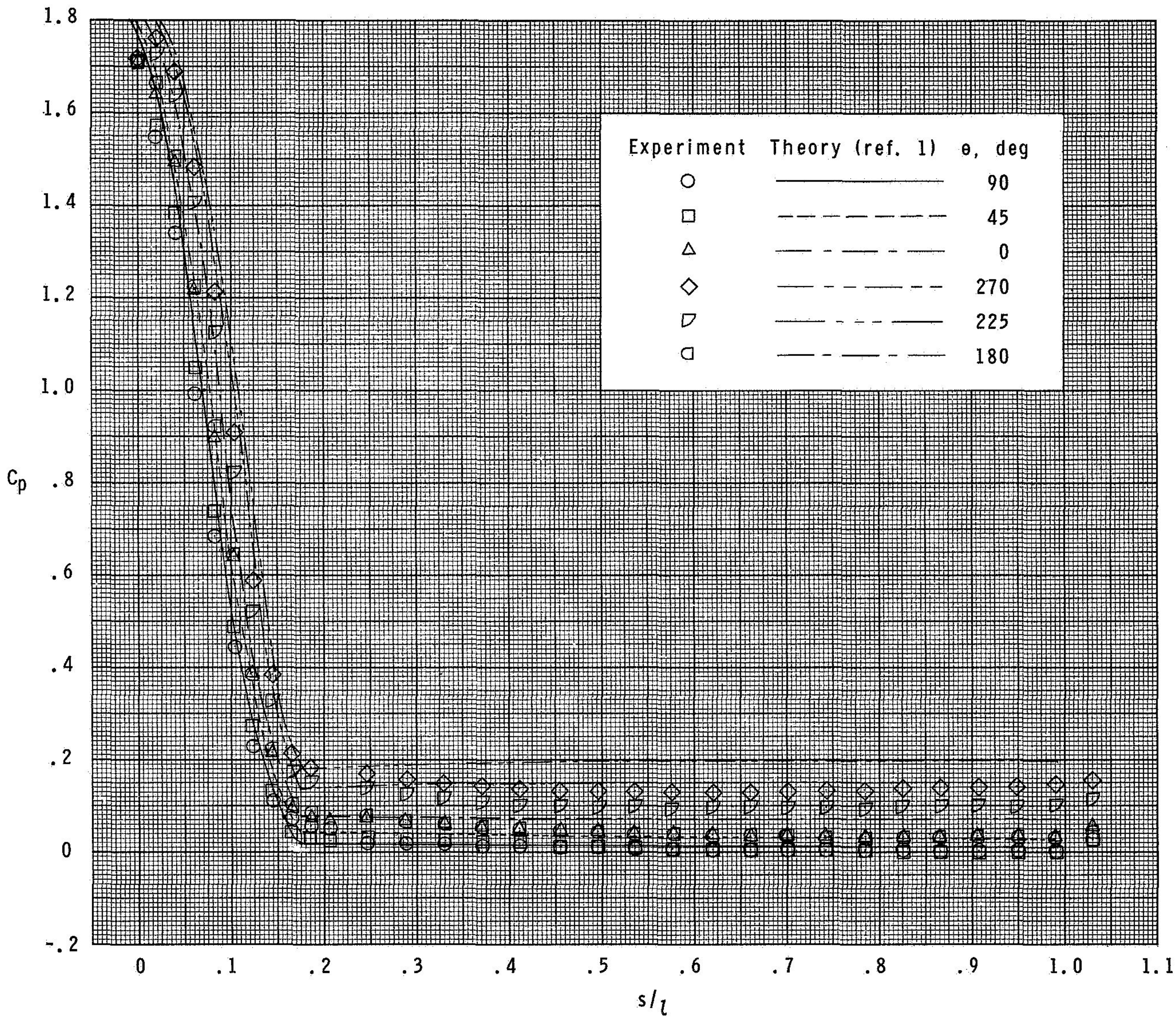
(a) $\alpha = 0^0$.

Figure 8.- Comparison of experimental and theoretical surface-pressure coefficients at $M_\infty = 4.63$.



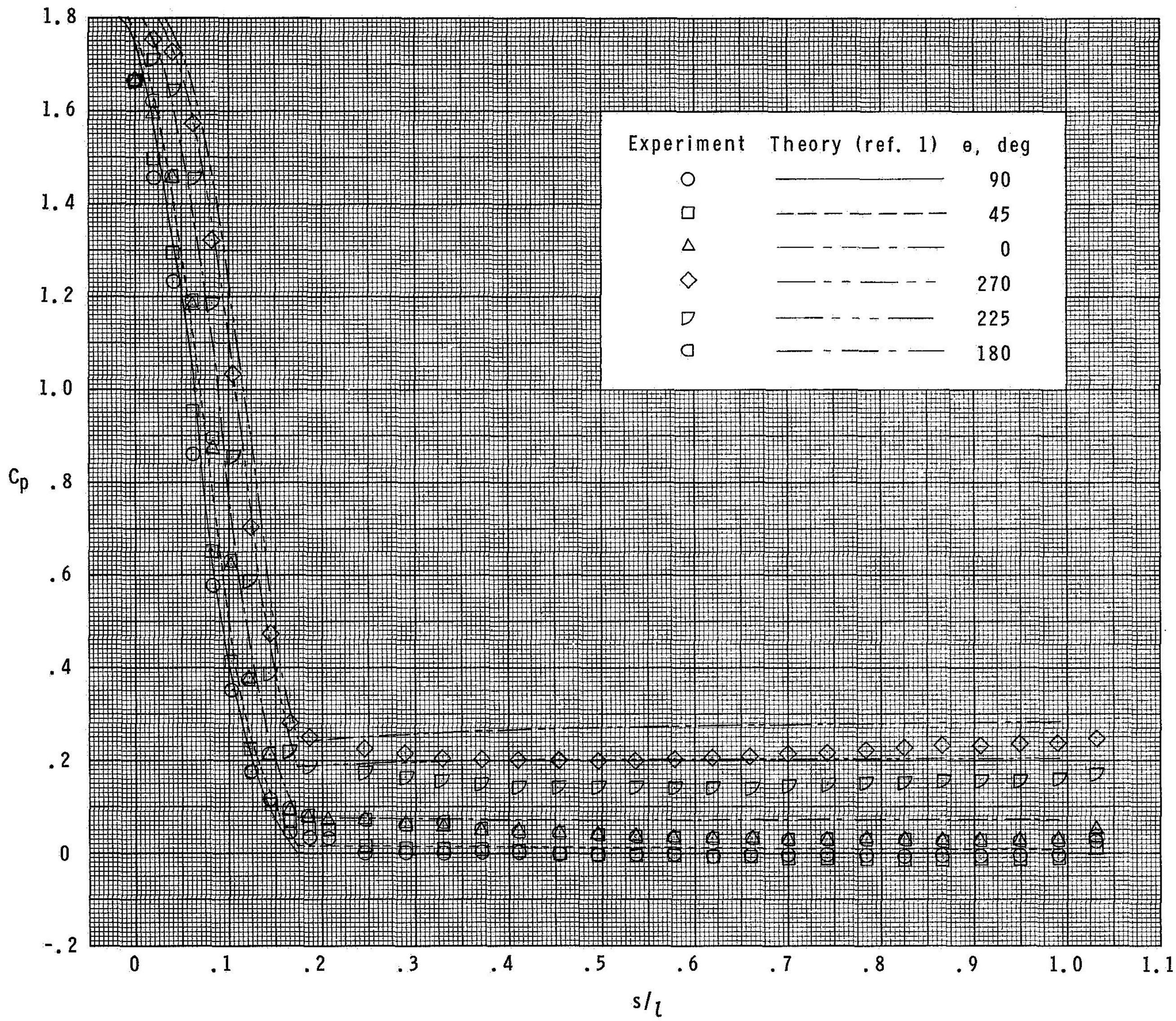
(b) $\alpha = 4^0$.

Figure 8.- Continued.



(c) $\alpha = 8^0$.

Figure 8.- Continued.



(d) $\alpha = 12^{\circ}$.

Figure 8.- Concluded.

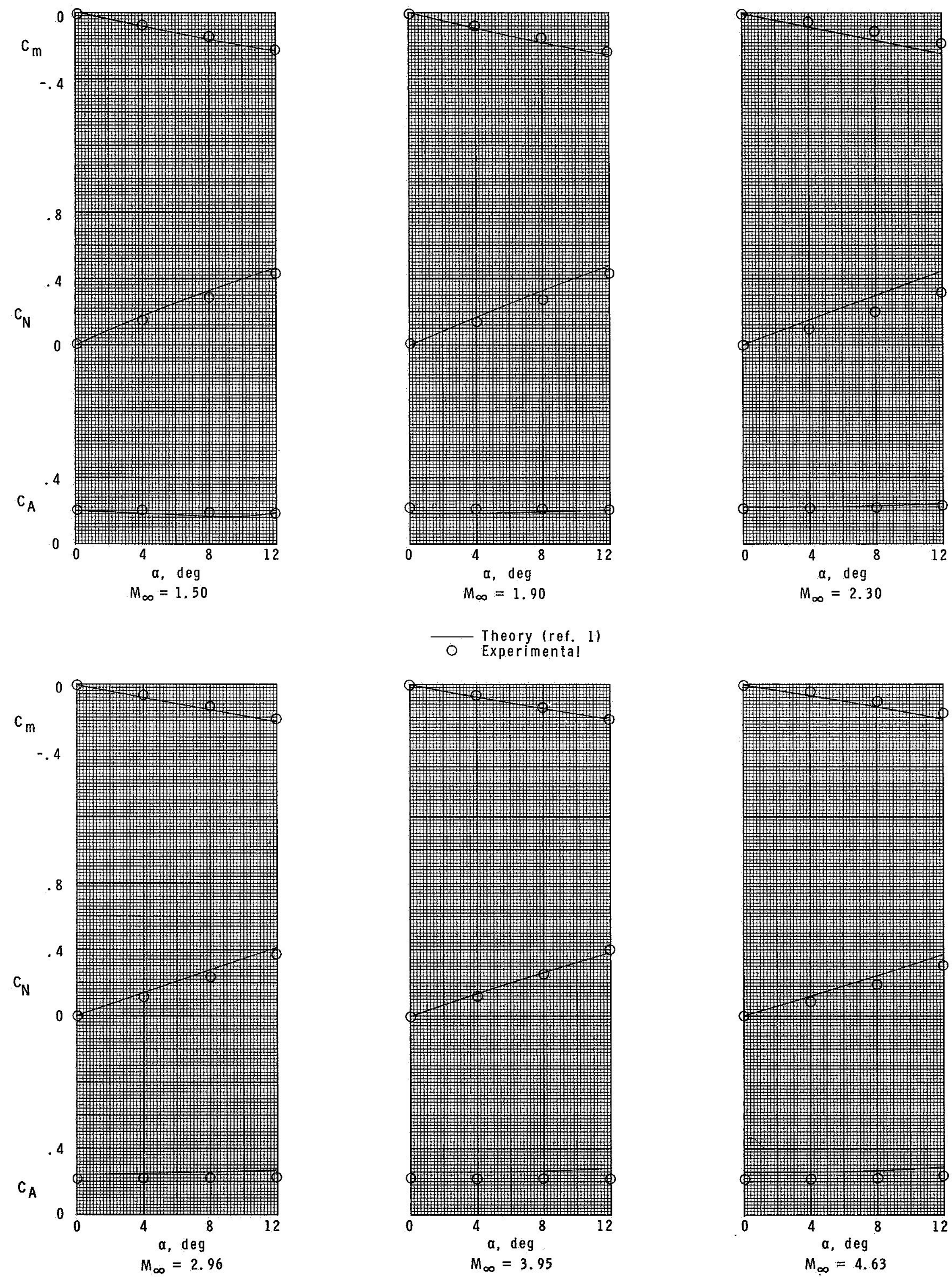


Figure 9.- Comparison of theoretical estimates of forces and moments with experimental results.

NASA-Langley, 1969 —— 1 L-6232

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